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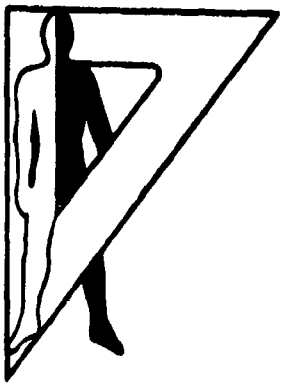

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Technical Note 1-81

COMPUTER SIMULATION MODEL OF AN AMMUNITION SUPPLY POINT: ISSUE OPERATIONS

Christopher C. Smyth

January 1981
AMCMS Code 612716.H700011

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A computer simulation model has been developed for the issue operations of an Ammunition Supply Point (ASP). The model would be useful in the study of the effects of changes in personnel, organization and equipment upon ASP mission performance. The model simulates the TOE 9-38-H3 Ammunition Company in support of 14 of the 29 battalions in a reinforced Armored Division during the second day of a determined defense. The ASP layout follows the US

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20. ABSTRACT (Continued)

Army Missile and Munitions Center School (USAMMCS) solution. The simulation program is written in the Fortran language and uses the GASP simulation programs.

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COMPUTER SIMULATION MODEL OF AN AMMUNITION SUPPLY POINT: ISSUE OPERATIONS

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COMPUTER SIMULATION MODEL OF AN AMMUNITION SUPPLY POINT:

ISSUE OPERATIONS

INTRODUCTION

A topic of interest to the US Army Missile and Munitions Center School (USAMMCS) and other members of the US Army logistics community, is the evaluation of changes in TOE, training and doctrine and their effects upon ammunition supply at the company level. At the request of the USAMMCS and in support of the US Army Human Engineering Laboratory Forward Area Supply & Transfer (USA HELFAST) studies, the US Army Human Engineering Laboratory (USAHEL) developed a stochastic computer simulation model for the issue operations of an Ammunition Supply Point (ASP). The model is in a form useful for the study of the effects of personnel, organization, equipment and physical layout upon mission performance. The ASP's are direct support supply points normally positioned in the Corps area near the rear boundary of combat divisions. The using units pick up ammunition in their own vehicles. The ASP's are routinely supplied on a scheduled basis from storage depots in the rear area.

The USA HELFAST field tests determined time distributions for ammunition handling (i.e., loading, transfer and unloading) involving material handling equipment for different ammunition types, cargo carriers and weather conditions. The simulation model uses the time distributions from the field tests for the ammunition handling tasks within the ASP. The model has been used to study ASP operations for critical areas which require further testing and evaluation. The model could be used to evaluate changes in TOE, training and doctrine. Furthermore, the model is easily extended to other areas of the US Army logistical system in future studies by the USAHEL and other members of the US Army logistical community.

The simulation program is written in the Fortran language and uses the GASP simulation programs. The model simulates an ammunition company in support of 14 of 29 battalions of a reinforced Armored Division during the second day of a determined defense. The ammunition expenditures are at the maximum rate, and the supported units replace their commodity loads by truck convoys back to the ASP. The model processes the convoys and trucks through the various sections of the ASP as they arrive from the supported units. Statistics are collected during the simulation on the queues, service times and idle times for each service point; i.e., vehicle inspection, office, field storage units, etc., within the ASP. The ammunition handling times are computed from normal [random] distributions. The simulation is run for a 24-hour period. The simulation can be repeated several times for a Monte-Carlo analysis.

The program simulates the operations of an TOE 9-38-H3 Ammunition Handling Company at strength level 1 and equipment level 1 as an acceptable baseline. Ammunition Company operations follow FM 9-38, Conventional

Ammunition Unit Operations, June 1970, with Change 1, 23 March 1973 and Change 2, 10 September 1976. Several noncombat essential operations, needed only for peace time accountability, were deleted following consultation with USAMMCS and USAHEL (retired) military personnel.

Ammunition supply doctrine, as defined in FM 9-6 (under revision), has each unit's resupply-convoy move from the battalion trains area, via the Division Ammunition Office (DAO), to the ASP. Return to the battalion trains is by the most direct route. The operation of the DAO was not modeled in this report as it is strictly clerical, but can be added later. Doctrine states that a division is supported by two ASP's and the model ASP supports half a division plus half the attached reinforcing battalions. The ASP is staffed by one Ammunition Company, TOE 9-38H3.

The ammunition supply demand placed on the ASP is determined by the using units; i.e., the combat and combat support battalions and their expenditures. The augmented armored division is described in Table 2 of Appendix F, Munitions System Support Structure, Volume I, Final Draft, April 1978, by the USAMMCS. A combat engineer battalion was added to the augmentation, and aviation, air defense and engineers were added within the division. Table 1 lists the number and type of units supported, the resupply vehicles and the number of convoys over a 24-hour period.

TABLE 1

Units Supported

Type-Battalion	No.	Resupply Vehicle	Trucks/ Convoy	Number of Convoys (24-Hour Period)
1. Mech Inf	3	GOER	2	2
2. Tank	3	GOER	3	2
3. 155 howitzer	3	GOER	12	3
4. 8-inch howitzer	2	GOER	8	3
5. ADA (Chaparral)	1	5-ton truck	5	1
6. Combat Engr	1	2-1/2-ton truck	13	4
7. Combat Avn	1	5-ton truck	6	2
Totals:	14			34

NOTE: 34 convoys equals: 186 GOERS
17 5-ton trucks
52 2-1/2-ton trucks
255 vehicle per 24 hours

NOTE: Distance [in km] from battalion trains to ASP:
To ASP - 39 to 67
From ASP - 30 to 55

The ASP and supported units were located in the following combat scenario: The terrain for modeling and the troop list were based on SCORES, Europe I, Sequence 2 Alpha. Since SCORES is not primarily logistical in orientation, there were further alterations. The US Army Materiel Systems Analysis Activity (AMSAA) was consulted to locate battalion trains for all battalions in the table. The covering force has been driven in and all troops were positioned on or behind FEBA for the second day of a determined defense. AMSAA also sited the Division Ammunition Office (DAO), the division airfield, and the two ASP's in support of the division. All personnel involved in these modifications, both in the Tactical Operations Analysis Office of AMSAA and in USAHEL, are retired military.

The supply demand on the ASP is determined by the transportation request presented by a using unit's convoy, and the number of times each unit sent out a resupply convoy during the 24-hour period. The transportation request is determined by three factors: (1) rate of expenditure (consumption data) for a determined defense, (2) basic load of the unit, and (3) transportation available within the unit for resupply.

The consumption data by unit type is extracted from US Army Logistics Planning Factors (JSCAP FY 80), and obtained from the Operations Analysis Directorate, Planning Factors Management Division, US Army Logistics Center (USALC). The size of the basic load is defined primarily in FM 101-10-1, July 1976. The transportation assumed available for ammunition resupply purposes is listed in the unit TOE.

A few ground rules for assembling convoys were set up after consulting with combat arms and combat support officers at Aberdeen Proving Ground. The unit uses a minimum number of daily convoys to the ASP so as to maintain command control with reliable convoy commanders and able map readers. One replenishes the basic load when 25-30% is expended. Combat aviation receives its logistic support at the division airfield and is resupplied by surface means. Project materials for engineer operations are drawn about four times a day. These rules may not be doctrine but are validated by such diverse considerations as combat experience, maneuver experience, map reconnaissance, and equipment availability.

Consumption data from USALC had to be expanded to cover bulk allotment items (as hand grenades and pyrotechnics), project materials (as mines and demolitions), and small rockets and guided missiles. Generally, FM 101-10-1 cited previously was the authority but Chaparral and Redeye data were generated locally at four missiles/Chaparral system per day and two missiles/Redeye team per convoy. No day of fire or per day of supply figure for air defense missiles has been officially defined.

The physical layout of the ASP is determined by the terrain and the quantity and types of ammunition stored in support of the using units. The ASP layout usually consists of at least the following sections: (Figure 1) vehicle assembly area, ASP operations control office, three ammunition storage sections, and a vehicle holding area, as well as segregation and demolition areas. The three storage sections contain the same types and amounts of ammunition as practicable. One section is used to issue and

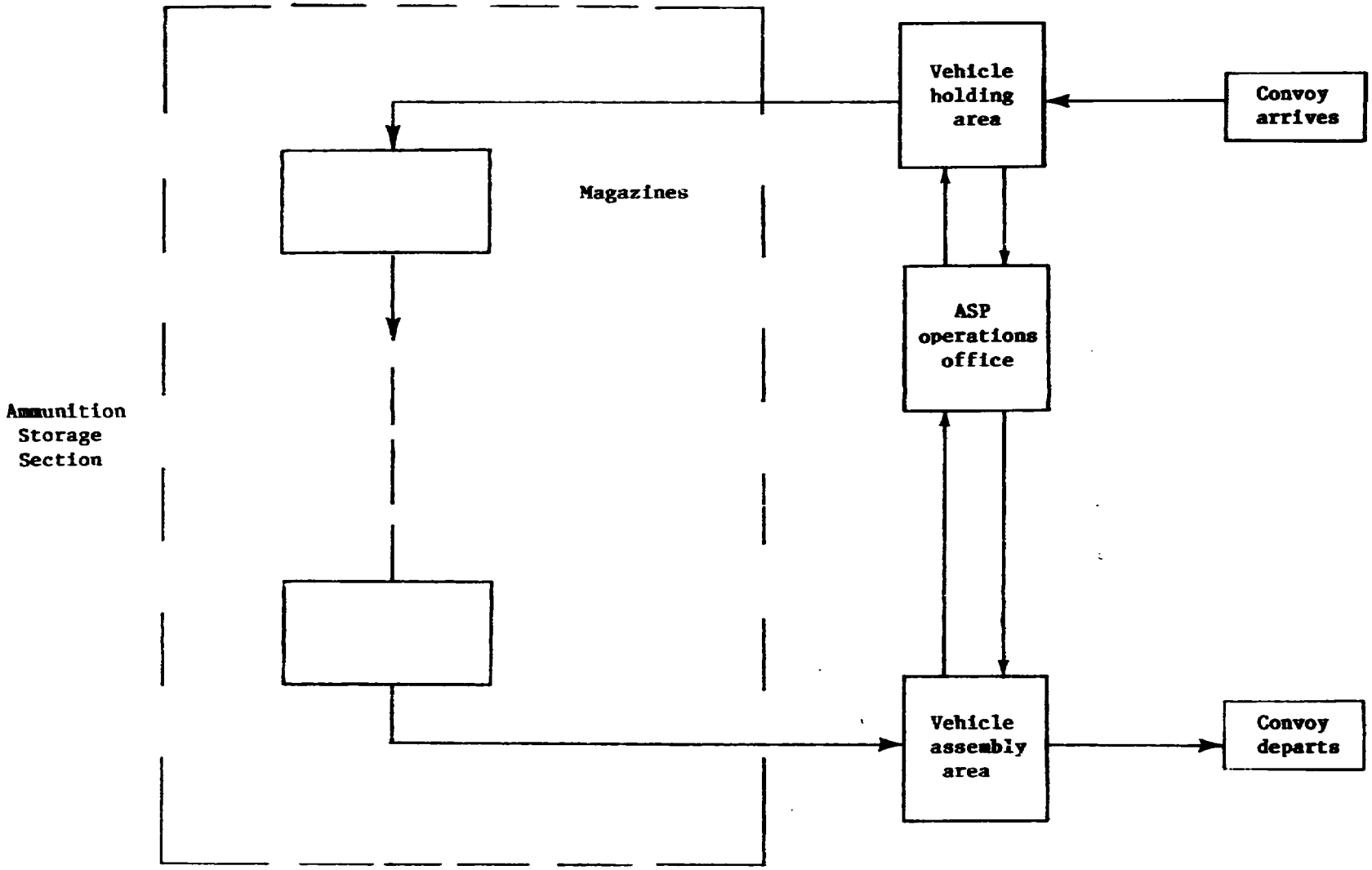


Figure 1. Layout of an ASP.

store ammunition and the other two for inventory and maintenance. These operations are rotated on a daily basis among the three sections.

The map layout is a "school solution" to Problem Sheet, "Storage of Ammunition in the Theater of Operations," USAMMCS, file number C20E-028P03, map sheet AA-2106. Fifty-five field storage units (FSU) are located on the road net. Storage is open or hasty. An ASP should stock about 3-5 days of issue by doctrine. The issue day programmed is on the high side, so 3 days stockage was planned. When the TR's described above are totaled for 3 days, a stockage of 5200 tons is determined. This was divided among 63 DODAC lines to be found in all six categories of storage. The most compact storage by regulation is described in Table 2.

TABLE 2

ASP Storage Limits

Storage Category	Tons	Max. Tons per FSU	FSU Required
A	436	400	2 (1)
B	3594	400	9
C	217	300	2 (1)
D	54	400	2 (1)
E	417	50	10
F	394	60	7
Totals	5112		32

Applying a rule that every DODAC line would be placed in two separate FSU locations for dispersion, the number of FSU used for the 63 DODAC lines became 46 with 9 being empty for this simplified program. The mileage of the loop within the ASP is about 12.5 km (7.5 miles) plus some spurs, so the old quantity-distance rule of 800 to 1000 tons/mile of road is easily met.

It was necessary to construct a master inventory deck of DODAC lines and a locator file to be used to make out the DA Form 3151-R, the Ammunition Stores Slip, which guides the loading of the individual vehicles (2).

Supply Bulletin, SB 38-26, Ammunition Supply Rates, contains about 150 DODAC lines. An ASP will stock most of these (except perhaps some pyrotechnic and engineer demolition items) plus a few rockets and small guided missiles not included in the supply bulletin. The master inventory deck constructed has about 130 lines, half of which will be inactive for play purposes. Lot numbers were ignored in maintaining the master inventory. The locator deck considers lot numbers only in the cases of major caliber tank gun ammunition; semifixed artillery ammunition; propelling charges for separate loading ammunition; and guided missiles. This choice was made primarily for reasons of performance (ballistics). Size of lot played was

determined by asking the RAM Division of AMSAA for war reserve lot size data on the types desired and filling the gaps by inquiry of the US Army Missile Command. The locator deck was considered split in two with about an equal number of cards in each subdeck. Since the file included only active DODAC lines in the ASP, there were a total of 150 cards or about 75 per subdeck.

The sequences of operations for issuing ammunition are listed in Table 3, which shows the flow from the supported battalions through the DAO to the ASP, and back to the supported units.

TABLE 3

Model Sequence

1. Convoy leaves Bn trains
2. Stops at DAO
3. Continues to ASP
4. Inprocesses paperwork
5. Vehicles proceed to pads
6. Vehicles loaded
7. Return to Assembly Area
8. Outprocess paperwork
9. Return to Bn trains

The procedures for issuing ammunition begins when an ammunition convoy of the using unit arrives at the ASP. The convoy is directed to the vehicle holding area by ASP traffic control personnel. The vehicles are inspected by technical support personnel for compliance with safety standards.

The convoy commander proceeds to the ASP operations office where he submits his transportation order for ammunition to the chief clerk in the stock records section. The order is checked against the stock location and lot records to determine the issuing storage magazines. The stock clerks prepare an ammunition stores slip for each vehicle in the convoy. The stores slip lists the DODAC and FSN, the lot number, the number of rounds and containers and the storage locations from which the items are to be issued. The chief clerk assigns an ammunition checker to each truck or group of trucks going to the same storage magazines. The clerk arranges for the labor and material-handling equipment (MHE) required for loading.

The checker assigned to each vehicle or group of vehicles guides the driver(s) to the proper storage location(s). The checker supervises the loading of the ammunition and verifies the type, lot number, condition and quantity received. When loading is complete, the vehicle proceeds to the vehicle assembly area where it waits for the remaining vehicles in the using unit's convoy. The ammunition received is verified at the ASP operations office. The stores slips are posted to the stock records. Once

verification is completed for all vehicles, the loaded convoy is released from the ASP.

So far as operational play was concerned, the company personnel were split into two 12-hour shifts. This allowed the ASP office to be adequately manned for the clerical operations, the MHE to be manned around the clock, and left 45 men from the magazine platoons available for use as checkers and/or labor on each of the two shifts. All truck drivers from the drawing unit were considered available as labor. Checkers were considered as labor if less than 10 boxes were to be hand loaded at any one field storage unit (FSU) location.

Internal play considered the ASP to be fully stocked at time zero (start of the simulation). Only the issue procedure was played. No resupply or warehousing (unlikely) were played. In the office, no inventory adjustments were played. Neither was the daily status of stocks report played. As an addendum to the TR, the using unit was considered to bring with it the desired loading of each vehicle in the convoy (commodity loaded), so that the ASP office did not have to figure that out. Neither did the ASP office keep any book on issues against available supply rate (ASR) by unit. MHE availability was 100%. The 24 MHE assigned to the Ammunition Company are assigned to one FSU or a small, group of adjacent (bloc of) FSU. MHE do not move long distances between work sites. The program is such that if two or three MHE are assigned to a bloc of FSU, they are utilized in sequence by arriving vehicles before formation of a queue of vehicles waiting to load; however, no more than two MHE's may be loading at the same FSU at the same time.

The ASP has a vehicle holding area for arriving convoys to wait while inprocessing is accomplished and a separate vehicle holding area for the loaded vehicles to reassemble into unit convoys before returning to their battalion trains areas.

In summary, the simulation model including the composition and layout of the ASP, the supported units and the resupply demand on the ASP have been described. In the next section, the resupply procedures used in the model are described in greater detail. Finally, the "Results" section describes the statistical results of the simulation.

METHOD

The operations of the ASP are simulated by the flow of customers between service facilities from the input side (i.e., convoy arrival) to the output side (i.e., convoy departure). The customer units vary from facility to facility, and in most cases, the customer must have reached prior stations before passing to the next one. The customer enters the service facility when it is not busy. Otherwise, the customer joins a queue and waits until he has moved up to the service point on a first-in, first-out queue discipline basis.

The incoming vehicles are inspected in the holding area. The convoy commander passes to the inprocessing office with his paperwork. There, the TR is processed in turn by the head clerk, a master file clerk and the locator file clerk. The clerks assign the trucks (and chits) and any needed laborers and checkers. The checker leaves the holding area with the vehicles (once they complete inspection) and laborers for the magazine area. The vehicles are loaded at the appropriate FSU by the laborers and/or MHE's in the magazine section. The loaded trucks are released to the convoy commander after the operations office has verified the issued ammunition.

The above customer actions and service facilities have been separated into the following time-oriented sequence of steps:

1. The battalion dispatches a convoy to the ASP via the DAO. The departure time is a random variable with a spread of 30 minutes centered about the convoy departure times given by Table 1. Initially, all units forward a convoy between BMNT (beginning morning nautical twilight) and BMNT plus 30 minutes.

2. The arrival time of the convoy at the holding area of the ASP is computed from the travel distance and a random travel speed of 30 km/hr plus or minus two standard deviations (ISD) for daylight or 15 $\pm$ 2SD km/hr for nighttime.

3. The inspectors from the ASP make a safety check of the incoming vehicles. The average inspection time is 5 minutes.

4. The convoy commander proceeds immediately upon his arrival to the ASP office with his TR and truck loading papers. The travel time is fixed.

5. The TR is processed through the ASP office in several stages:

a. The chief clerk scans the TR and associated papers for general completeness.

b. The master file clerk takes the TR and posts as a debit to the appropriate DODAC cards in the master inventory.

c. The locator deck clerks receive the TR and truck loading addendum from the master inventory clerk. The truck loading addendum has been written up by the unit by DODAC in terms of pallets and/or boxes for each truck. Using this addendum (and the TR), the locator clerks write the individual DA Form 3151 (Ammo Storage Slip) for each truck, considering lot numbers where appropriate and FSU location. They also post the issues on each DODAC locator card by lot number and FSU. The two clerks work as parallel but independent service points as directed by the master file clerk.

d. The locator desk clerk passes the sheaf of Forms 3151 to the noncommissioned officer (NCO) in charge of assigning checkers and laborers. The assignment NCO scans the deck of Forms 3151 and assigns a checker to one or more trucks (one or more Forms 3151) and also assigns zero to two laborers to the checker.

6. The checker, truck(s), and laborers proceed to the first FSU in his stack of Forms 3151 (a known measured mileage) at 15 $\pm$ 2SD km/hr for daylight or 8 $\pm$ 2SD km/hr for nighttime.

7. Using MHE available at the FSU, pallets are loaded. Stochastic loading times are used. Using laborers available, individual boxes or containers are loaded. Four minutes per laborer per box was used (7 tons liftman/day). Loading is sequential for a checker. Queues form when MHE is not available. If labor loading can be done while awaiting MHE, it is done. Upon completion of loading at first FSU, the checker with his trucks and laborers proceeds to the next FSU and repeats process (steps 6 and 7).

8. The checker, truck(s), and laborers proceed to the convoy reassembly area (known mileage) at 15 $\pm$ 2SD km/hr (daylight).

9. Checker and laborers walk to ASP office (15 minutes). Checker turns sheaf of annotated Forms 3151 over to ASP office chief clerk. (It is assumed there are no major discrepancies and no need to correct inventory or locator files.) Checker reports to assignment NCO. Laborer reports to assignment NCO. Both are picked up in available pool.

10. Convoy commander picks up checker (and laborer) with last truck(s) arriving at reassembly area and drives him to ASP office (1 km at 15 $\pm$ 2SD km/hr). Checker and laborer same routine as step 12.

11. Convoy commander clears TR with ASP office chief clerk, gets annotated copy, and receipts copy left at ASP. Returns to convoy and departs.

12. Convoy returns to battalion trains area by most direct route (measured) at 30 $\pm$ 2SD km/hr for daylight and 15 $\pm$ 2SD km/hr for nighttime. Arrival time for convoy is recorded.

The service times for the office clerks in step 5 were determined by two experienced subjects (retired military personnel) who timed themselves while they processed the paperwork for each unit. These times are considered fixed without random variation for the present until appropriate stochastic data can be collected.

The simulation program is separated into two parts, the user's program and the GASP supporting routines. The user's portion specifies the customer traffic flow within the ASP and the mechanisms of the service facilities. The GASP supporting routines are called upon to do bookkeeping tasks such as ordering time events, random number generation, statistical computations and preparing summary reports.

The GASP routines maintain a file of ordered time events. As each new time event is added to the file by the user's program, the file is reordered according to the time of occurrance. The file stores attributes as well as the time of occurrance of the event. These are an event coding denoting what type of event has occurred, and the using unit's convoy and if appropriate, the truck or checker for which the service event took place. These attributes are assigned by the user's program and are stored by the GASP routines.

Once program control is passed to the GASP support routines, the next time event is removed from the file along with the associated attributes. The GASP routine returns control to the user's subroutine, EVENTS, along with the event coding. The subroutine, in turn, calls upon the appropriate user's subroutine to service the event according to the event code. The event attributes of the convoy and truck identifiers are used by the subroutines to locate the information needed for servicing. Table 4 lists the various events with their coding which can occur in this simulation.

TABLE 4

Simulation Events

Code	Event	Figure
1.	Convoy leaves unit	-
2.	Convoy arrives at holding area	2
3.	Safety inspector completes vehicle inspection	3
4.	Convoy commander at inprocessing office	4
5.	Chief clerk completes TR service	5
6.	Master file desk completes service	6
7.	Locator file clerk completes service	7
8.	Checker released from holding area with trucks	8
9.	Checker completes road trip to ammunition pad	9
10.	Loading service completed at ammunition pad	10
11.	Checker arrives at convoy assembly area	11
12.	Checker arrives at operations office	12
13.	Convoy commander at outprocessing office	13
14.	Clerk completes outprocessing service	14
15.	Convoy arrives back at unit	-

The figures (2 through 14) referenced by Table 4 show flow-charts of the steps for the processing of the events. Each figure corresponds to a subroutine in the program which processes one of the time events. In all cases, the subroutine either adds the unit to be serviced; i.e., convoy representative or trucks, to a waiting queue or computes a service time for the unit and adds the service to the event file.

The table and figures show that the program "walks" the convoy representatives and their trucks through the ASP starting at the holding area and ending with the outprocessing. The pattern of passing the next time event to the user's program for servicing and the addition of a new event to the file is repeated until the file is depleted of all events. At this time, the GASP routine computes the statistics of the simulation as called for by the user's program. The next section lists the statistics and results collected for the simulation problem described earlier.

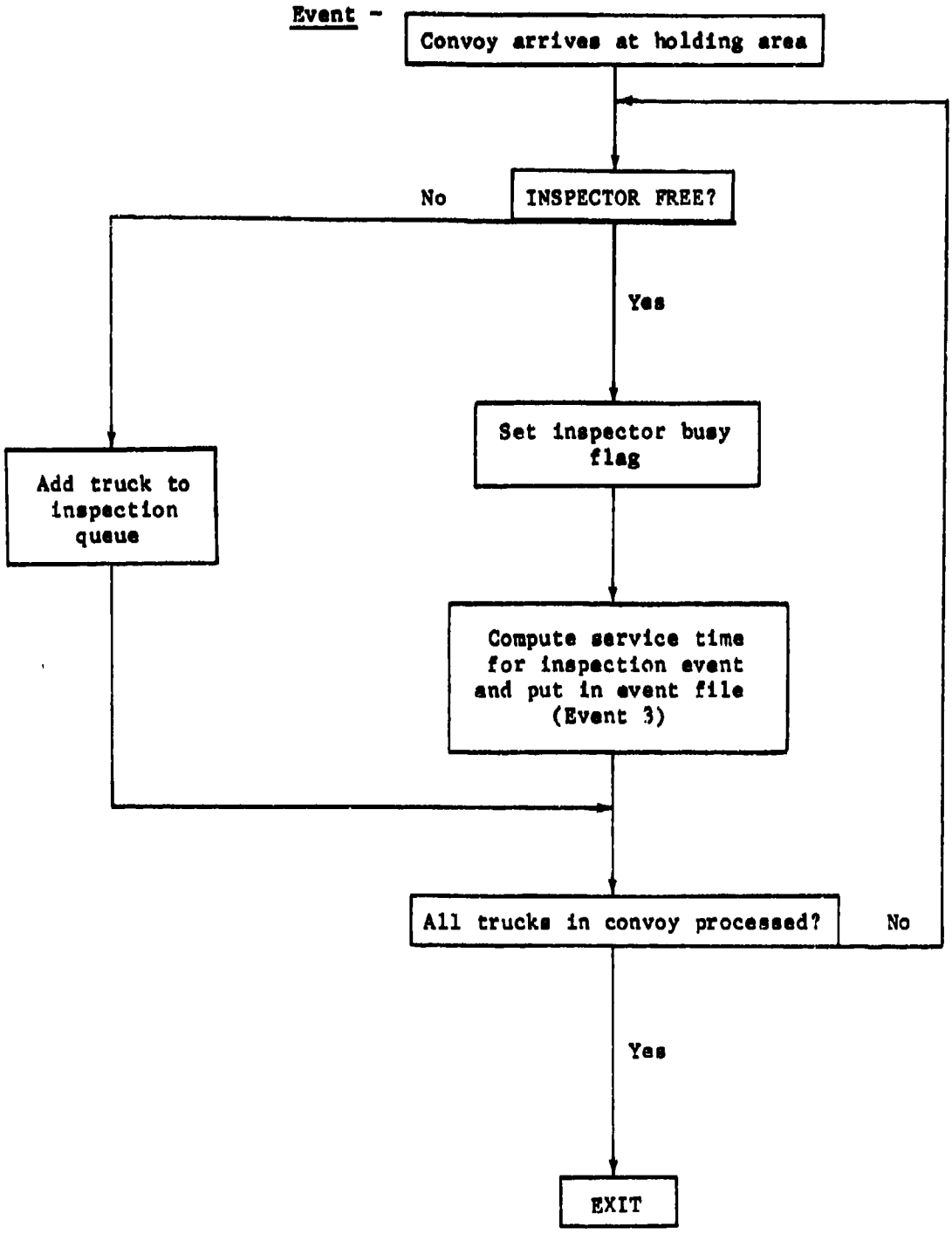


Figure 2. Macro-flow chart for event 2.

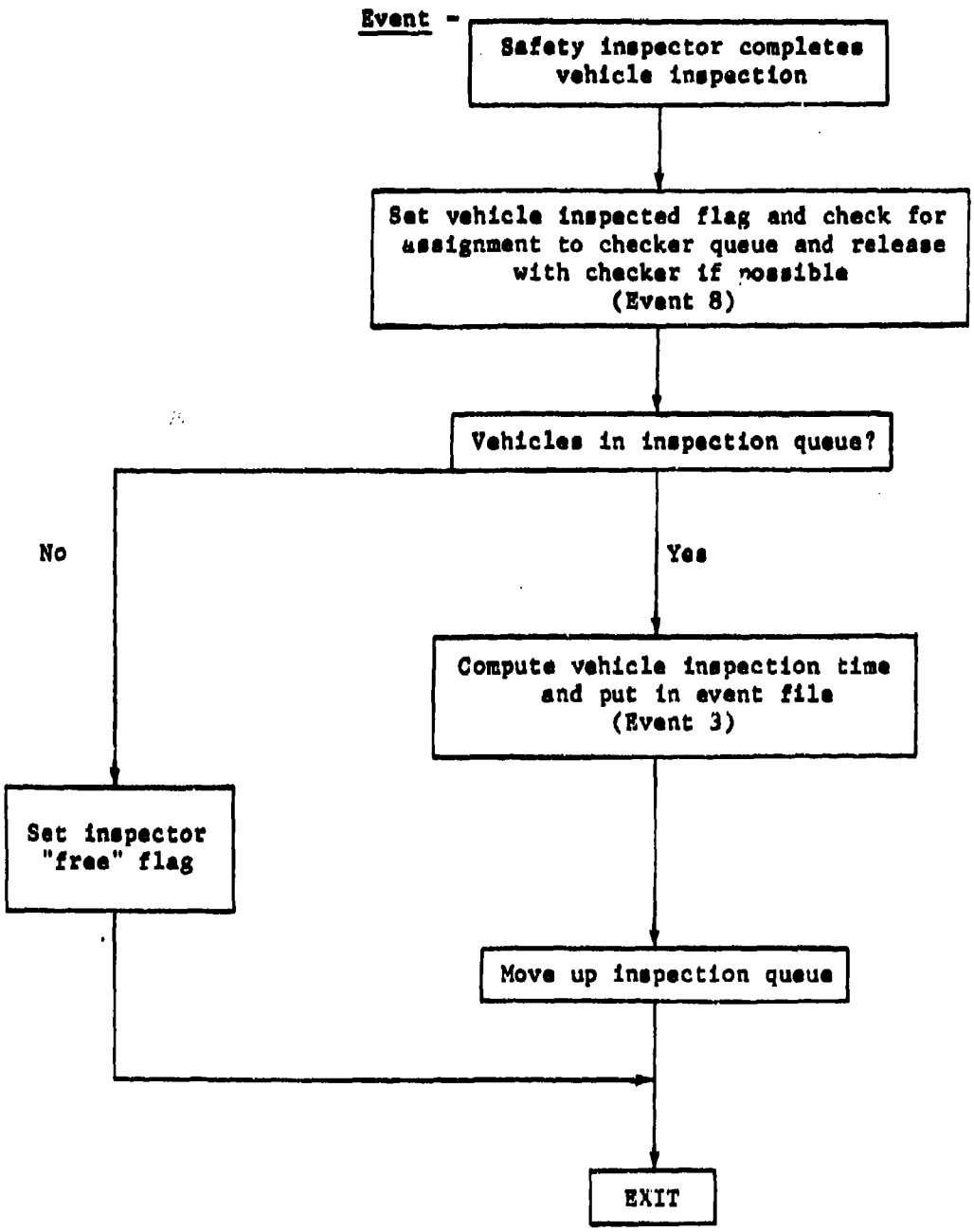


Figure 3. Macro-flow chart for event 3.

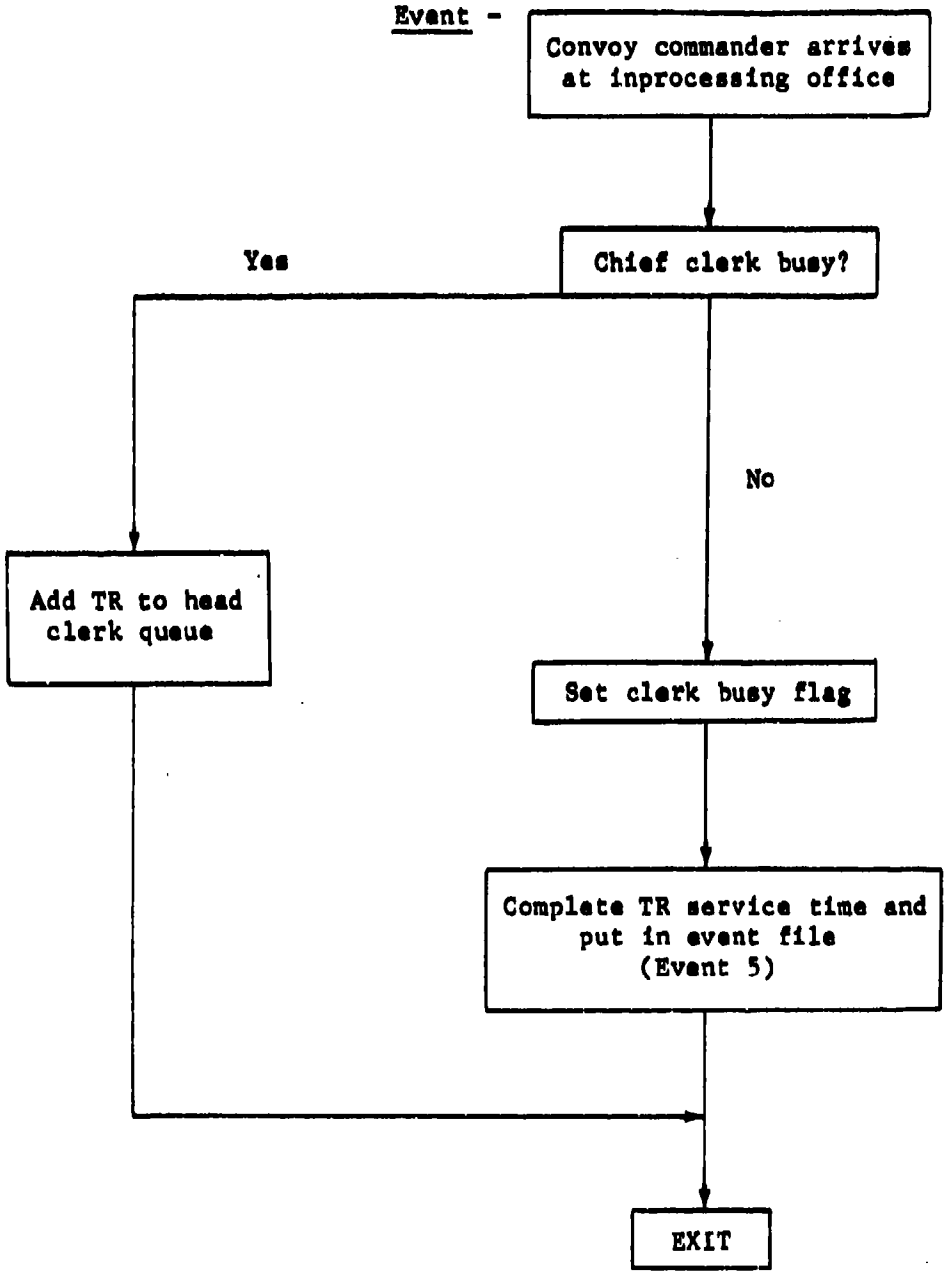


Figure 4. Macro-flow chart for event 4.

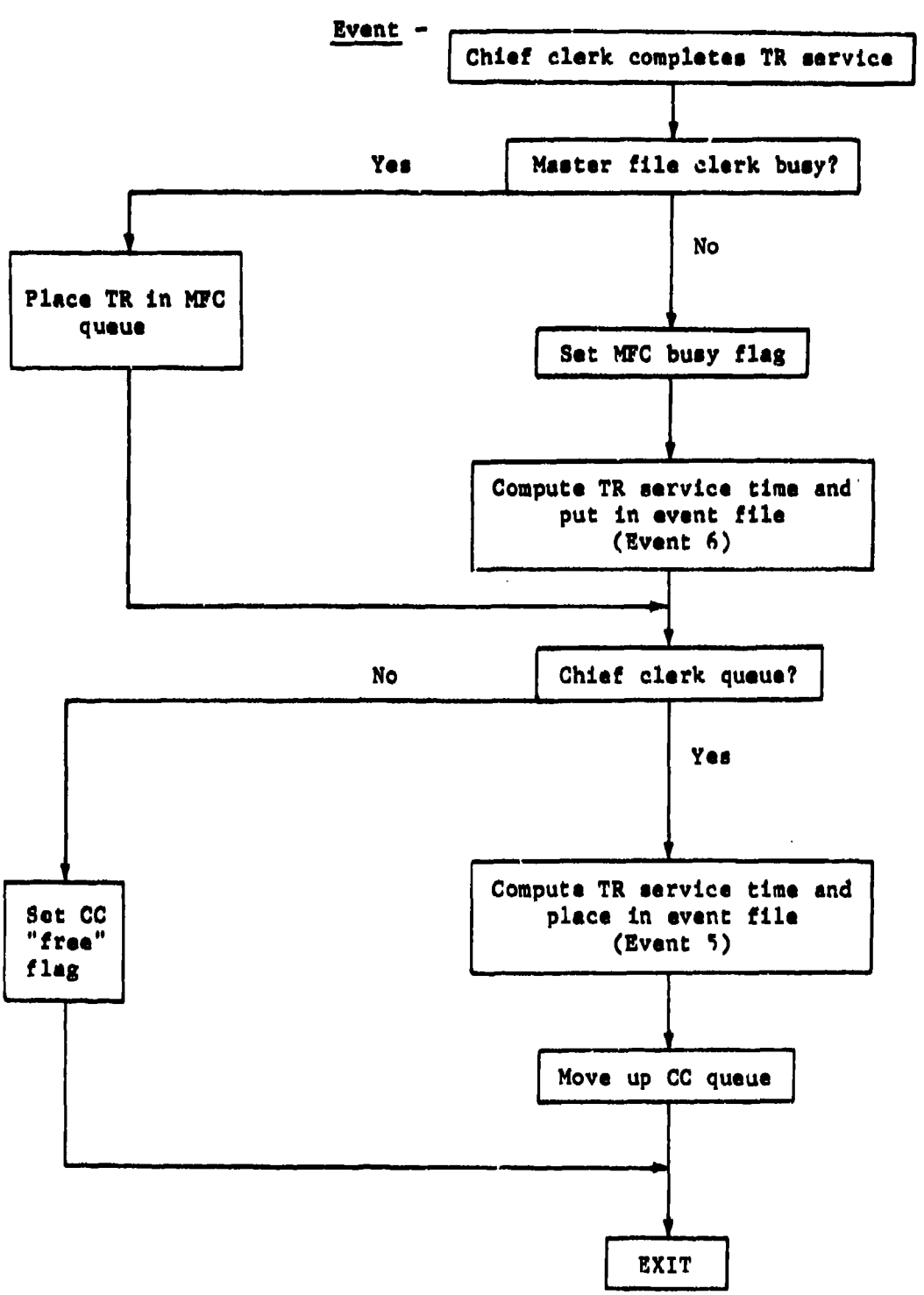


Figure 5. Macro-flow chart for event 5.

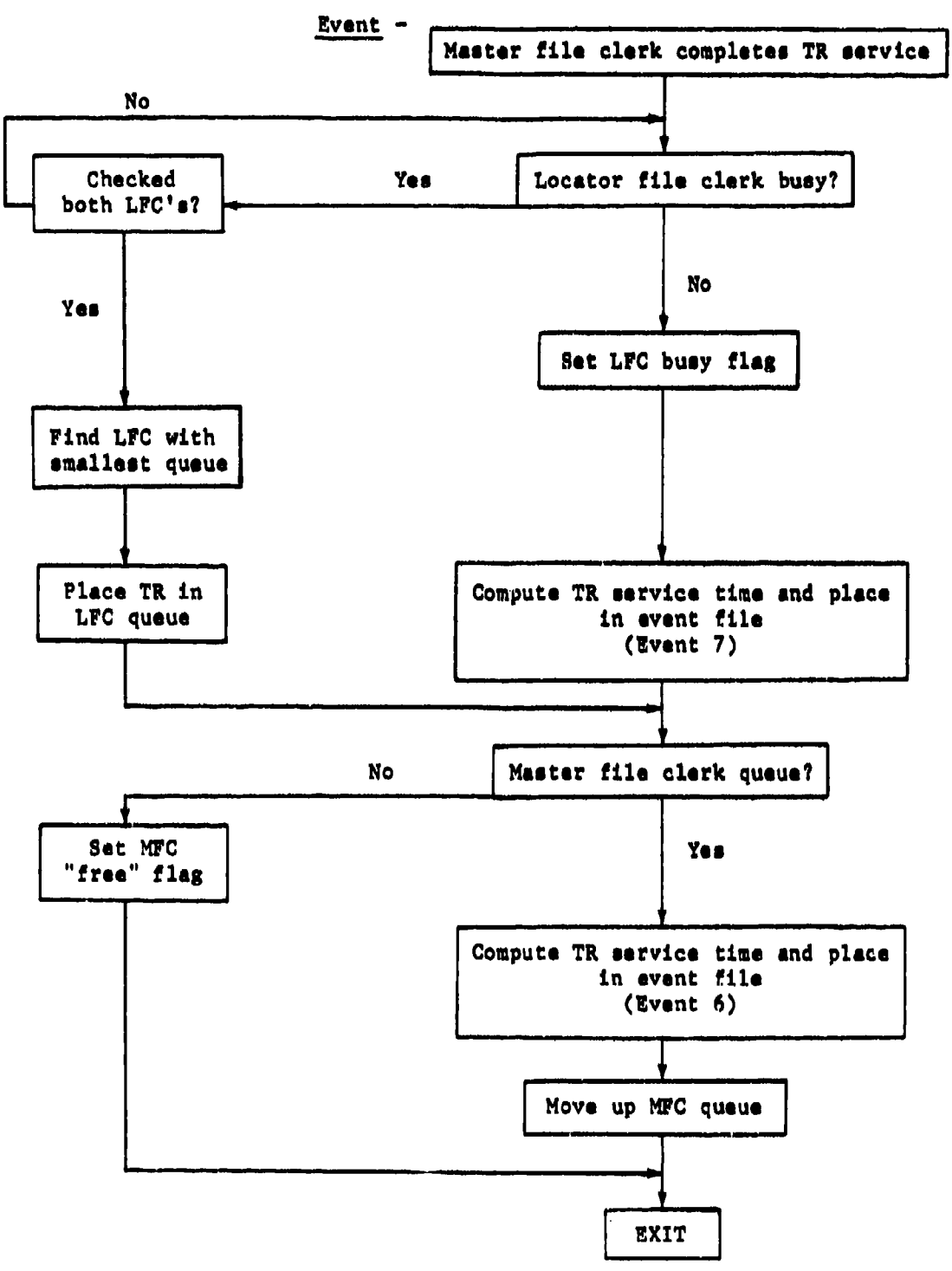


Figure 6. Macro-flow chart for event 6.

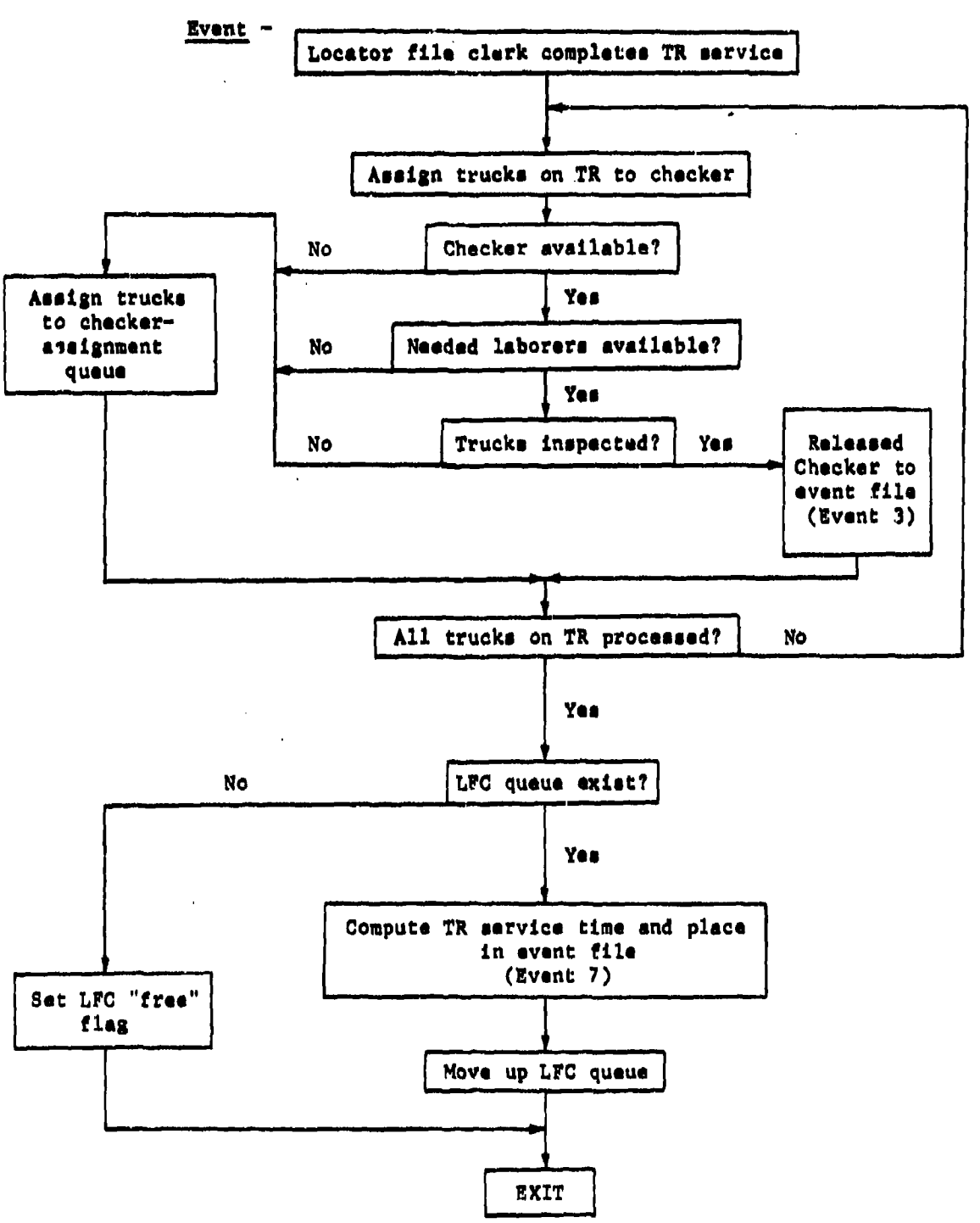


Figure 7. Macro-flow chart for event 7.

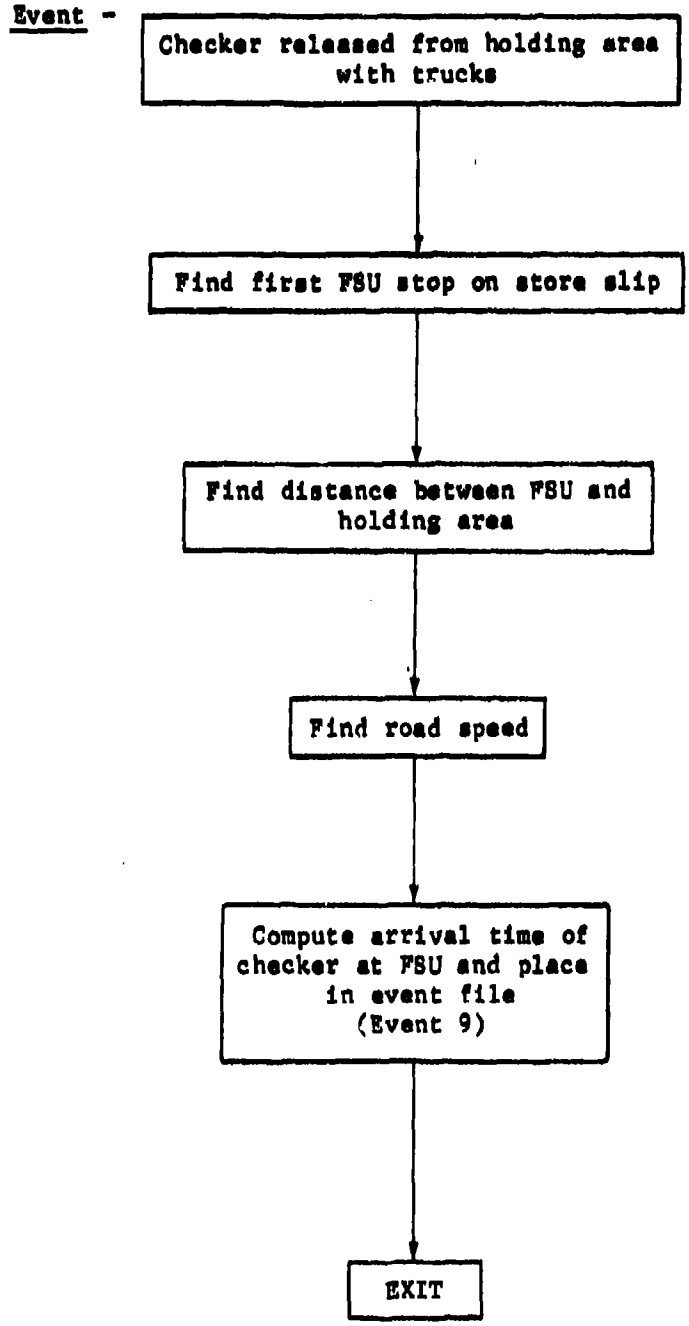


Figure 8. Macro-flow chart for event 8.

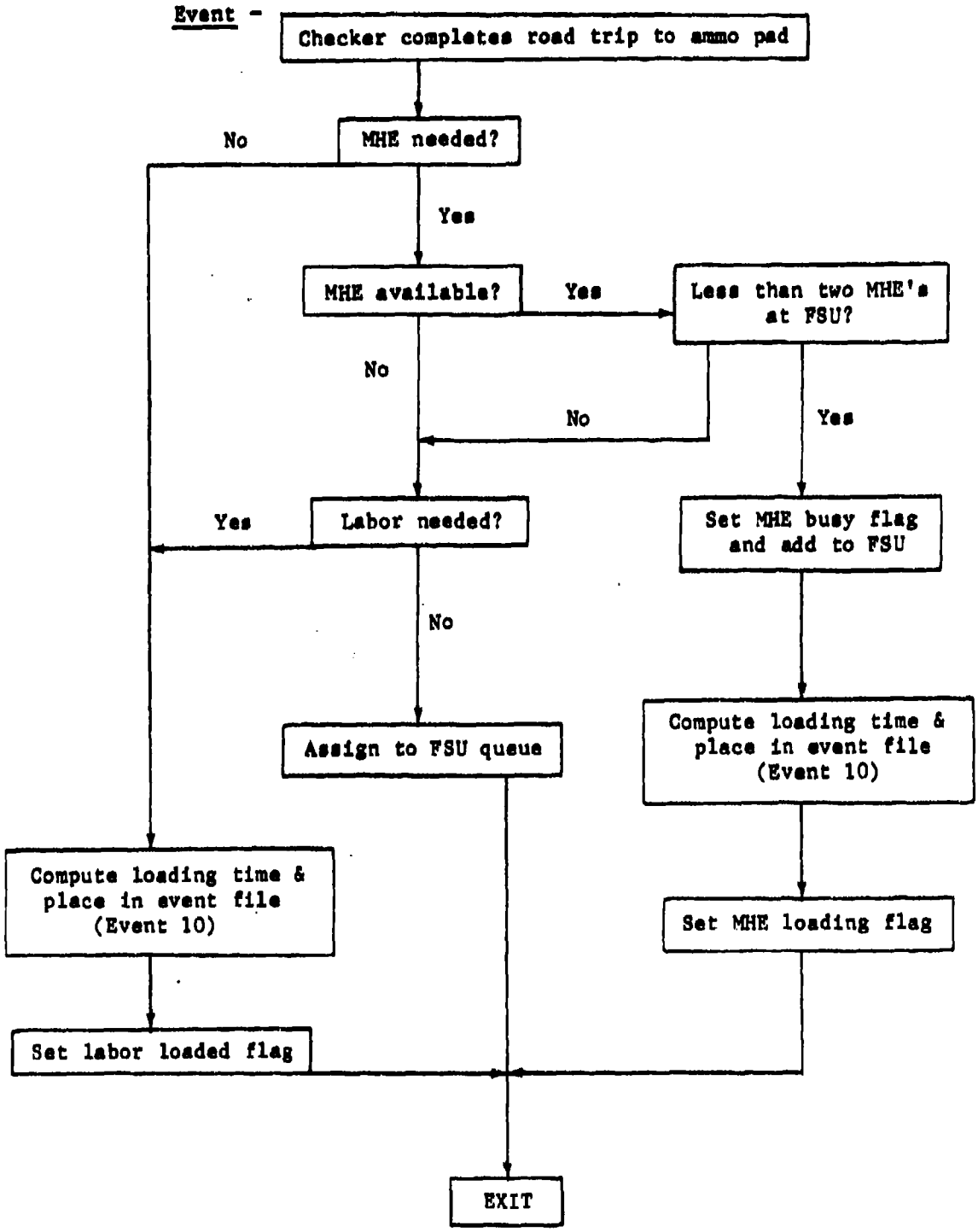


Figure 9. Macro-flow chart for event 9.

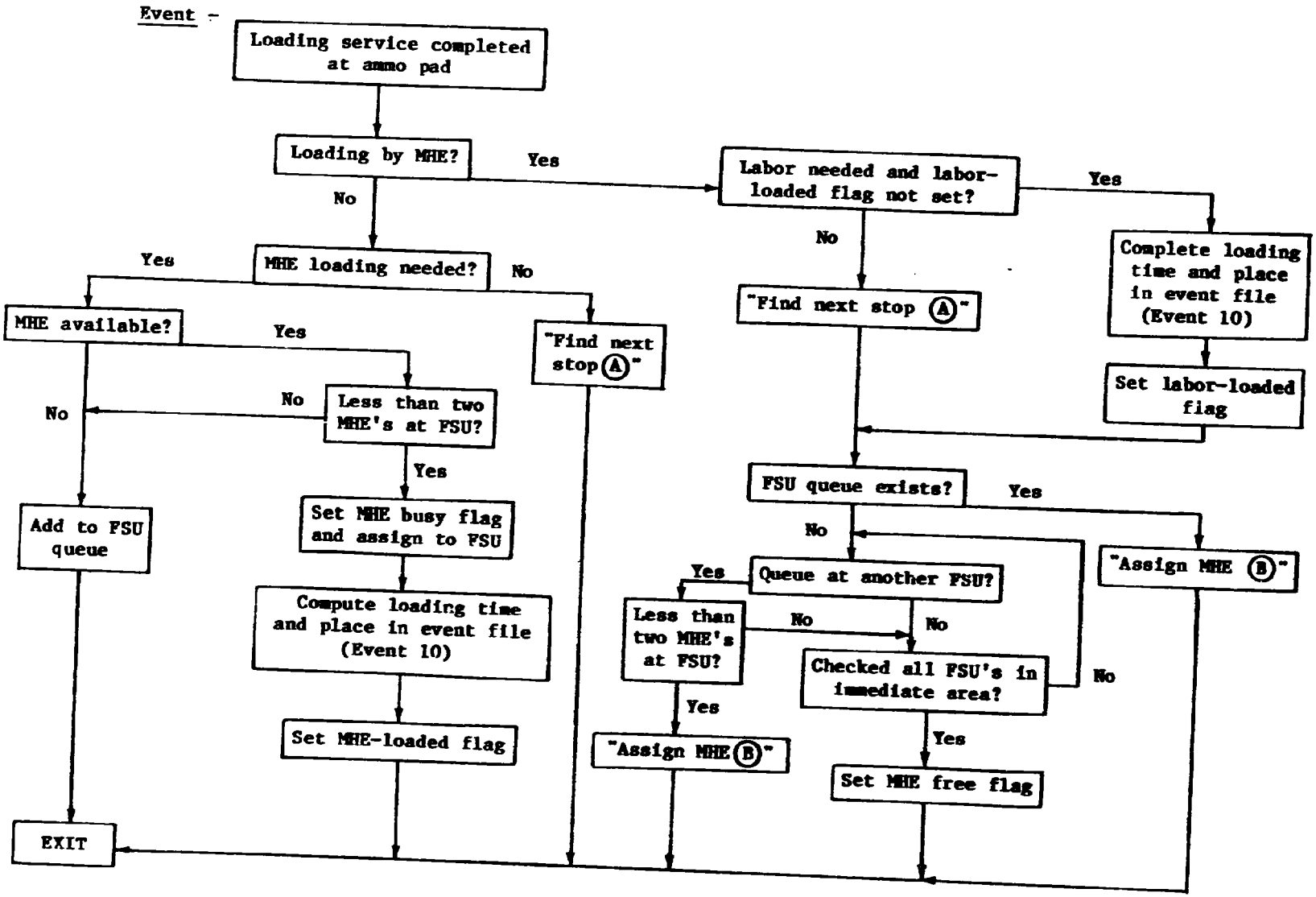


Figure 10. Macro-flow chart for event 10.

(Continued)

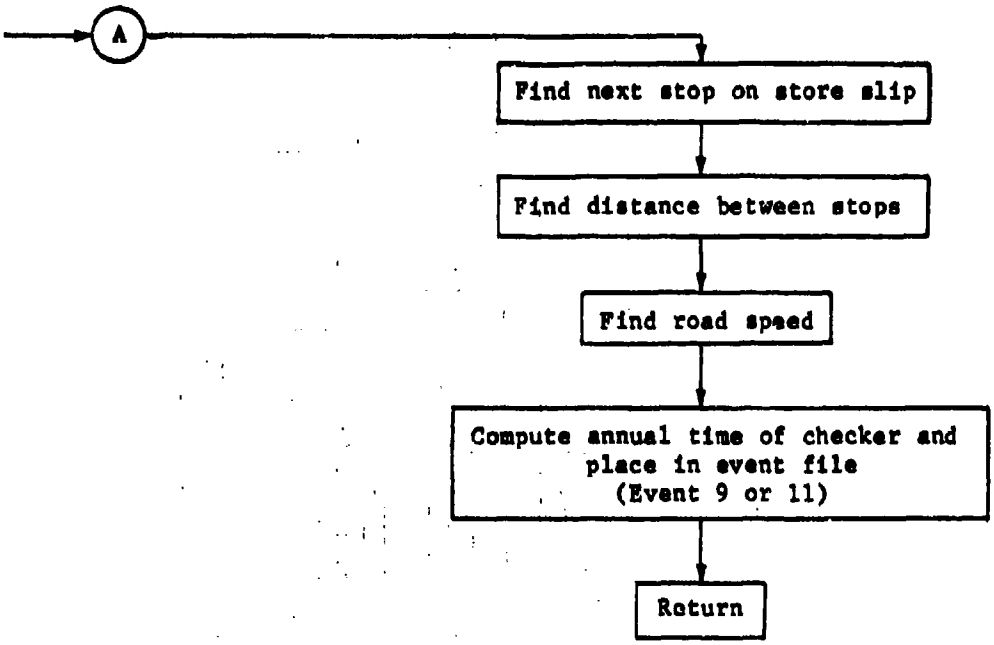


Figure 10a. Macro-flow for "find next stop (A)".

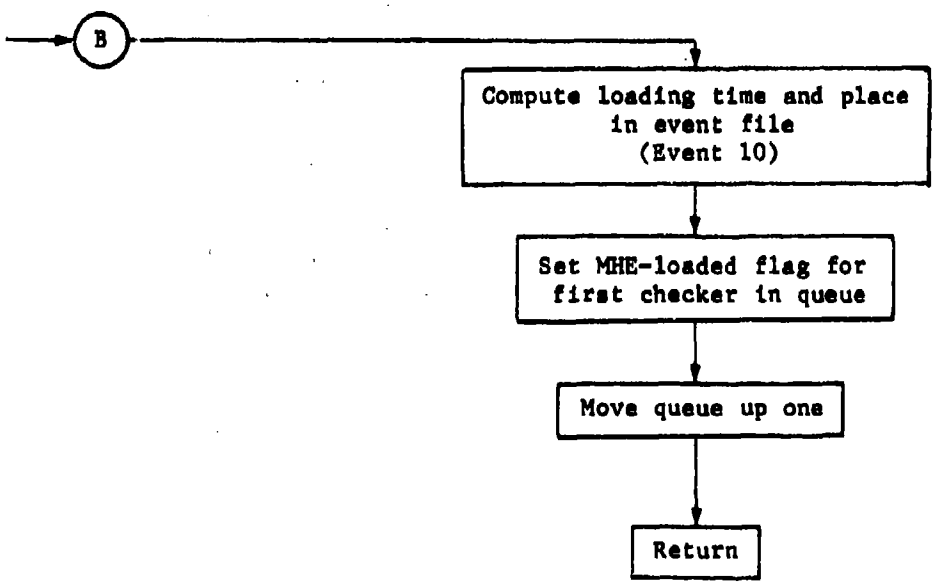


Figure 10b. Macro-flow for "assign MHE (B)".

Figure 10. Macro-flow chart for event 10.

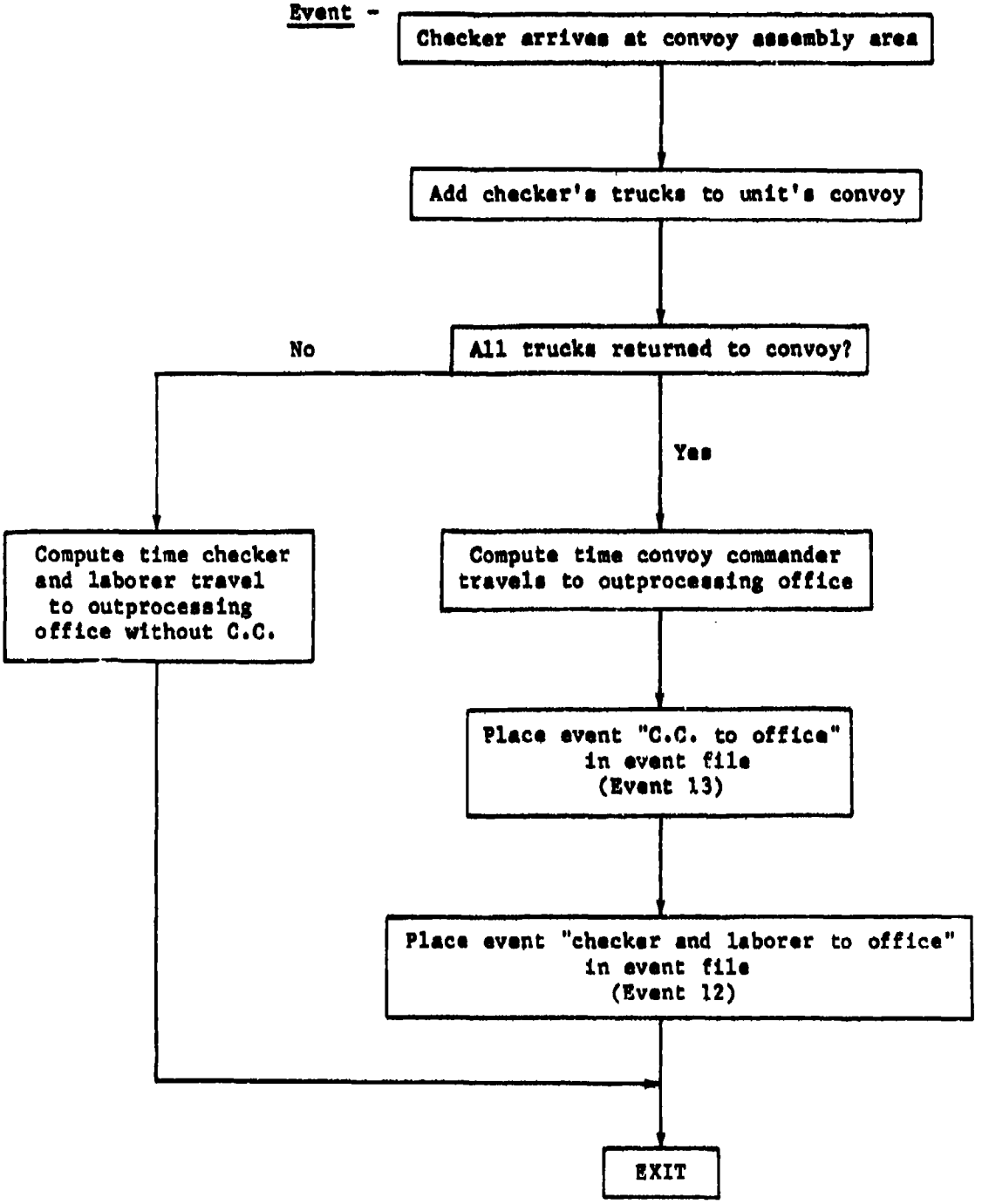


Figure 11. Macro-flow chart for event 11.

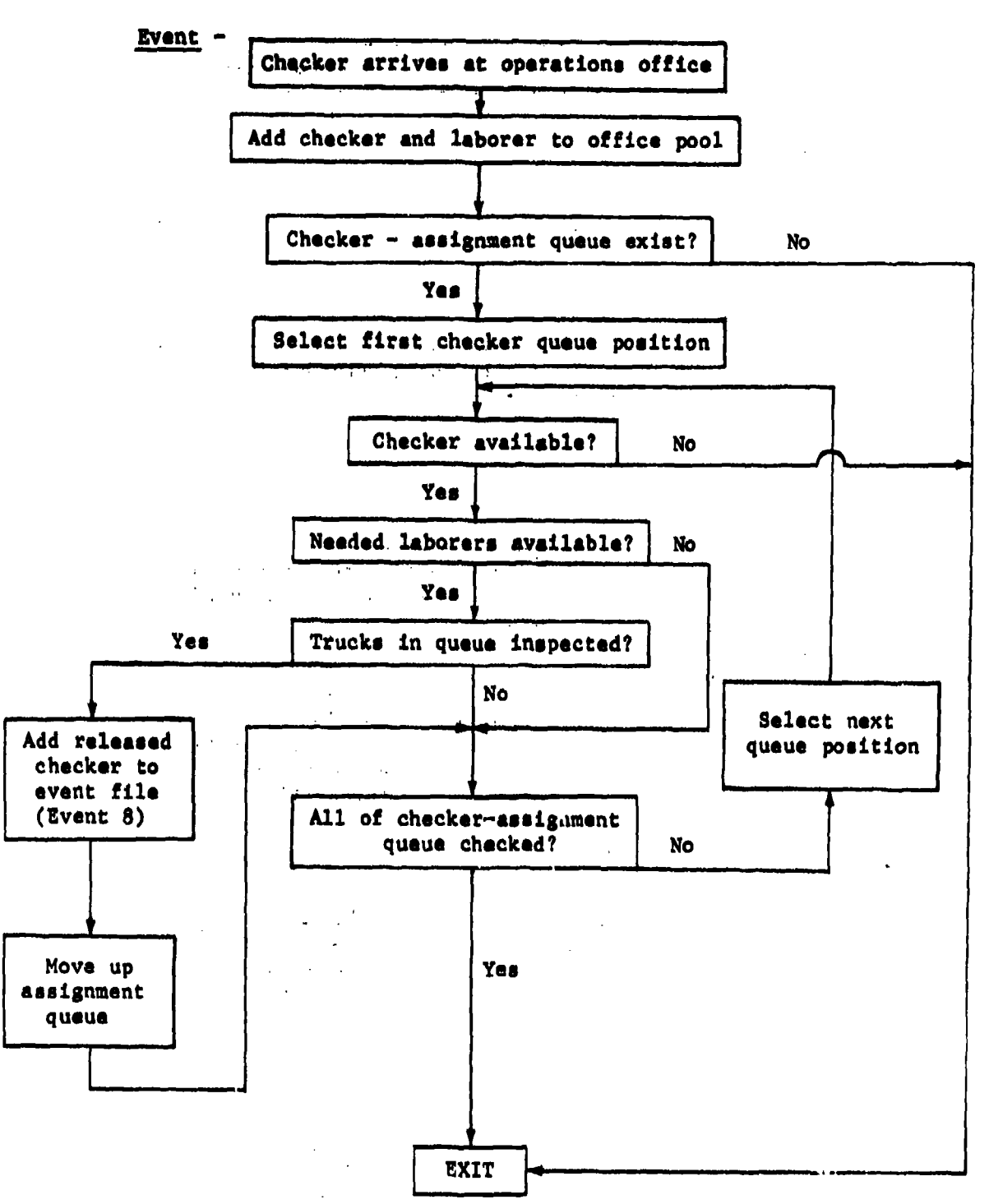


Figure 12. Macro-flow chart for event 12.

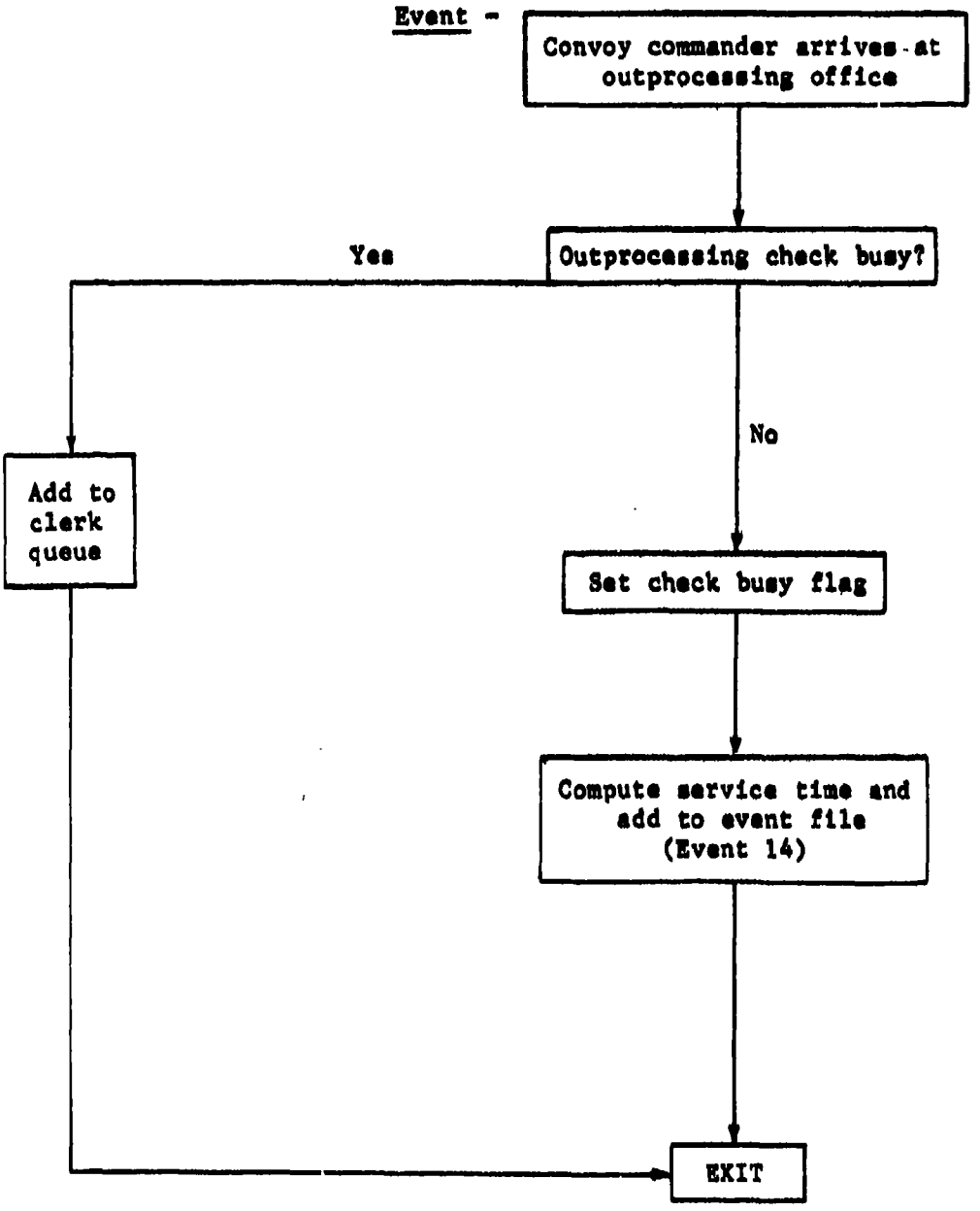


Figure 13. Macro-flow chart for event 13.

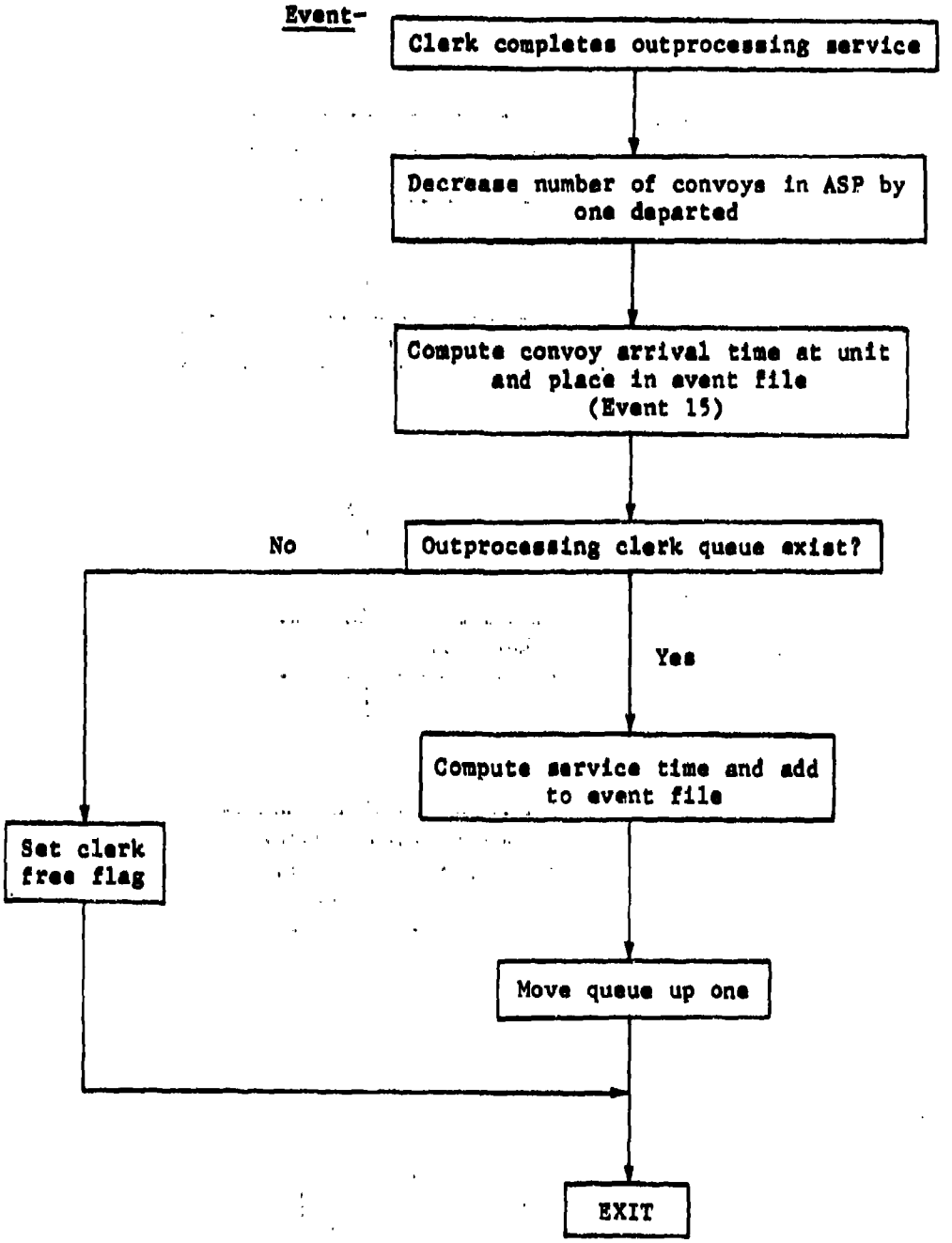


Figure 14. Macro-flow chart for event 14.

RESULTS AND DISCUSSION

The statistics collected by the simulation program are listed in Tables 5, 6 and 7. Table 5 lists the observed-time statistical variables. The average value and standard deviation are computed for these variables. Table 6 lists the time-persistent numeric statistical variables for which the average value, standard deviation, maximum and minimum values are computed. Table 7 lists queue summary statistical variables. The computed values are (1) the average element (Ave Queue), (2) the average wait time before service (Ave Wait), (3) the average service time (Ave Service) and (4) the fraction of time that the facility is idle (Fraction Idle).

TABLE 5

Observed Time Statistical Variables

(a) Supply point input to output (ASP) -
-W/CN, time convoy within ASP
-A/CN, difference in convoy arrival times
-D/CN, difference in convoy departure times

(b) Inprocessing office (OFI) -
-W/CC, time convoy commander within office
-Q/HE, time TR in chief clerk (HC) queue
-S/HC, service time of chief clerk
-Q/MC, time TR in master clerk queue
-S/MC, service time of master clerk
-Q/LC, time TR in locator clerk queue
-S/LC, service time of locator clerk

(c) Holding area (HLD) -
-W/TK, truck time within holding area
-D/CK, difference in checker departure time

(d) Loading area (LDA) -
-W/CK, time checker within loading area
-Q/CK, time checker in FSU queue for MHE service
-S/MH, service time by MHE
-S/LB, service time by laborers
-TRVP, travel distance per truck within LDA
-T/CK, travel time for checker within LDA

(e) Convoy assembly area (ABY) -
-A/CK, difference in checker arrival times
-W/TK, time truck within assembly area

(f) Outprocessing office (OFO) -
-W/CC, time convoy commander within office
-Q/CC, time within clerk queue
-S/CC, service time of clerk

TABLE 6

Time Persistent Number Statistical Variables

(a) Supply point input to output (ASP) -

-N/CN, number of convoys within ASP
-N/TK, number of trucks within ASP

(b) Inprocessing office (OFI) -

-N/CC, number of convoy commanders within office
-N/HC, number in chief clerk queue
-N/MC, number in master clerk queue
-N/LC, number in locator clerk queue

(c) Holding area (HLD) -

-N/SP, number of inspectors busy in HLD
-N/TK, number of trucks in HLD

(d) Loading area (LDA) -

-N/CK, number of checkers within loading area
-N/LB, number of laborers within LDA
-N/TK, number of trucks within LDA
-N/MH, number of active MHE's within LDA
-N/FS, number of active FSU's within LDA

(e) Convoy assembly area (ABY) -

-N/TK, number of trucks within assembly area

(f) Outprocessing office (OFO) -

-N/CC, number of convoy commanders within office
-N/OC, number in clerk queue

TABLE 7

Queue Summary Statistics

Facility	
(a)	Loading area -
	INSP - inspection station
(b)	Inprocessing office -
	NANC - chief clerk MASC - master clerk LOCC - locator clerk CKAG - checker assignments
(c)	Loading area -
	FSU - Field storage unit MHE - material handling equipment
(d)	Outprocessing office
	OUTC - outprocessing clerk

Table 8 lists the nomenclature of histogram plots (Figures 15 through 21), and Table 9 lists the nomenclature of plot variables (Figure 22).

The statistical results for a 24-hour simulation are listed in Tables 10 and 11. Table 10 lists the results of the observed variables of Table 5 and the results for the time-persistent variables of Table 6. Table 11 lists the statistical results for the queue variables of Table 7.

Figures 15 through 21 show histograms of the frequency of events as listed in Table 9. Figure 15 shows a histogram of the number of trucks in each convoy. Figures 16 through 21 show the queue size of service facilities at the arrival of the next element to be serviced. The facilities are listed in Table 9 and include the vehicle inspection, the head clerk, the master clerk, the locator clerks, the checker assignment roster and the outprocessing office clerk.

TABLE 8

Nomenclature of Histogram Plots
(Figures 15 through 21)

Table	Description
TKS/CONV	Number of trucks in convoy
INSP/QUE	Number of trucks in inspection queue
HC/QUE	Number of TR's in head clerk queue
MC/QUE	Number of TR's in master clerk queue
LC/QUE	Number of TR's in locator clerk queue
CKA/QUE	Number of checker-assignments in queue
OC/QUE	Number of TR's in outprocessing queue

TABLE 9

Nomenclature of Plot Variables
(Figure 22)

Table	Symbol	Description
TKS/ASP	T	Number of trucks in ASP
CON/ASP	C	Number of convoys in ASP
TKS/HLD	H	Trucks in holding area
TKS/LDA	L	Trucks in loading area
TKS/ABY	A	Trucks in assembly area
CC/OFI	I	Number of TR's in inprocessing office
CC/OFO	O	TR's in outprocessing office
CK/HLD	K	Number of checkers in holding area
LB/HLD	B	Number of laborers in holding area

Figure 22 is a plot of ASP-variables at 10-minute increments during the 24-hour simulation. The variables are listed in Table 10 and include the number of convoys and trucks in the ASP, the number of trucks in the holding area, the loading area and the assembly area, the number of TR's in the inprocessing offices, and the number of checkers and laborers in the holding area. The plot shows the dynamic changes which occur between the service facilities within the ASP.

HISTOGRAM NUMBER 1

TKS/CONV

OBSV FREQ	RELA FREQ	CUML FREQ	UPPER CELL LIMIT
0	0.000	0.000	1.0000
6	.176	.176	2.0000
6	.176	.353	3.0000
0	0.000	.353	4.0000
1	.029	.382	5.0000
2	.059	.441	6.0000
0	0.000	.441	7.0000
6	.176	.618	8.0000
0	0.000	.618	9.0000
0	0.000	.618	10.0000
0	0.000	.618	11.0000
9	.265	.882	12.0000
4	.118	1.000	13.0000
0	0.000	1.000	14.0000
0	0.000	1.000	15.0000
0	0.000	1.000	16.0000
0	0.000	1.000	17.0000
0	0.000	1.000	18.0000
0	0.000	1.000	19.0000
0	0.000	1.000	20.0000
0	0.000	1.000	21.0000
0	0.000	1.000	INF
34			

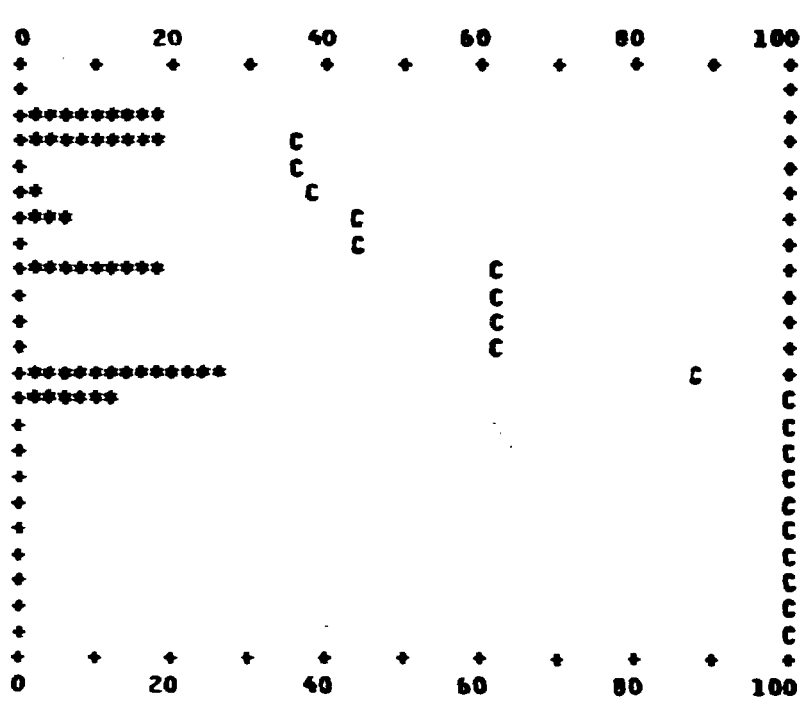


Figure 15. Histogram for number of trucks in each convoy.

HISTOGRAM NUMBER 2

INSP/QUE

OBSV FREQ	RELA FREQ	CUML FREQ	UPPER CELL LIMIT
103	.404	.404	1.0000
13	.051	.455	2.0000
12	.047	.502	3.0000
12	.047	.549	4.0000
13	.051	.600	5.0000
13	.051	.651	6.0000
13	.051	.702	7.0000
12	.047	.749	8.0000
12	.047	.796	9.0000
10	.039	.835	10.0000
9	.035	.871	11.0000
8	.031	.902	12.0000
6	.024	.925	13.0000
4	.016	.941	14.0000
3	.012	.953	15.0000
3	.012	.965	16.0000
3	.012	.976	17.0000
3	.012	.988	18.0000
1	.004	.992	19.0000
1	.004	.996	20.0000
1	.004	1.000	21.0000
0	0.000	1.000	INF
255			

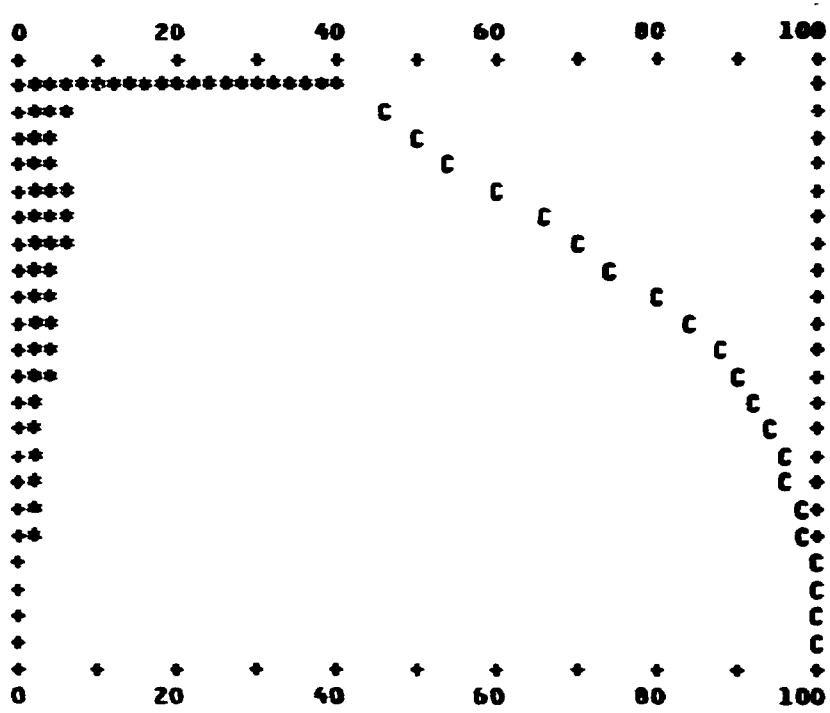


Figure 16. Histogram for vehicle inspection queue.

HISTOGRAM NUMBER 3

HC/ QUE

OBSV FREQ	RELA FREQ	CUML FREQ	UPPER CELL LIMIT
34	1.000	1.000	1.0000
0	0.000	1.000	2.0000
0	0.000	1.000	3.0000
0	0.000	1.000	4.0000
0	0.000	1.000	5.0000
0	0.000	1.000	6.0000
0	0.000	1.000	7.0000
0	0.000	1.000	8.0000
0	0.000	1.000	9.0000
0	0.000	1.000	10.0000
0	0.000	1.000	11.0000
0	0.000	1.000	12.0000
0	0.000	1.000	13.0000
0	0.000	1.000	14.0000
0	0.000	1.000	15.0000
0	0.000	1.000	16.0000
0	0.000	1.000	17.0000
0	0.000	1.000	18.0000
0	0.000	1.000	19.0000
0	0.000	1.000	20.0000
0	0.000	1.000	21.0000
0	0.000	1.000	INF

34			

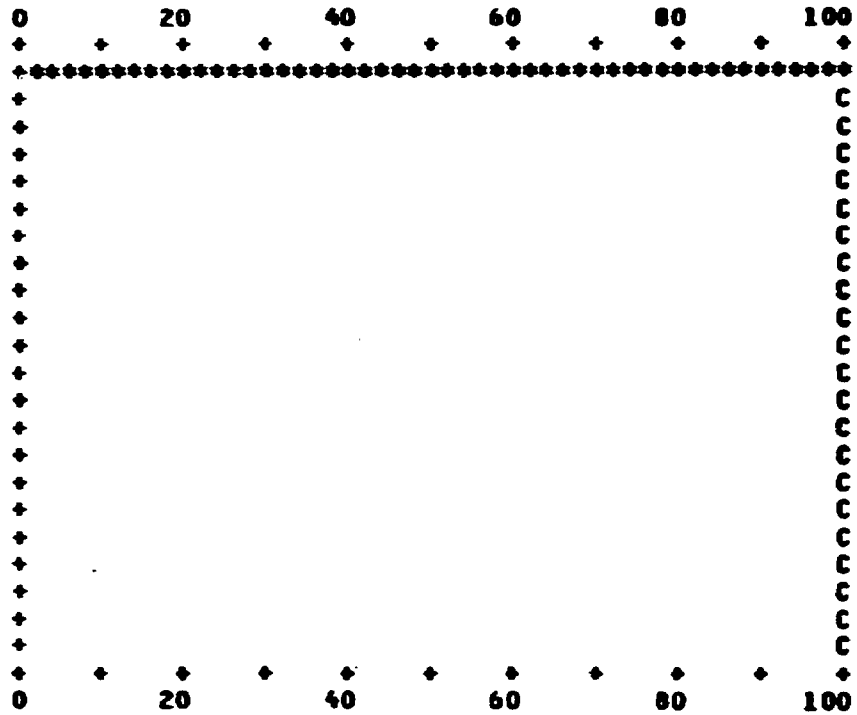


Figure 17. Histogram for head clerk queue.

HISTOGRAM NUMBER 4

MC/ QUE

OBSV FREQ	RELA FREQ	CUML FREQ	UPPER CELL LIMIT
25	.735	.735	1.0000
7	.206	.941	2.0000
2	.059	1.000	3.0000
0	0.000	1.000	4.0000
0	0.000	1.000	5.0000
0	0.000	1.000	6.0000
0	0.000	1.000	7.0000
0	0.000	1.000	8.0000
0	0.000	1.000	9.0000
0	0.000	1.000	10.0000
0	0.000	1.000	11.0000
0	0.000	1.000	12.0000
0	0.000	1.000	13.0000
0	0.000	1.000	14.0000
0	0.000	1.000	15.0000
0	0.000	1.000	16.0000
0	0.000	1.000	17.0000
0	0.000	1.000	18.0000
0	0.000	1.000	19.0000
0	0.000	1.000	20.0000
0	0.000	1.000	21.0000
0	0.000	1.000	INF
34			

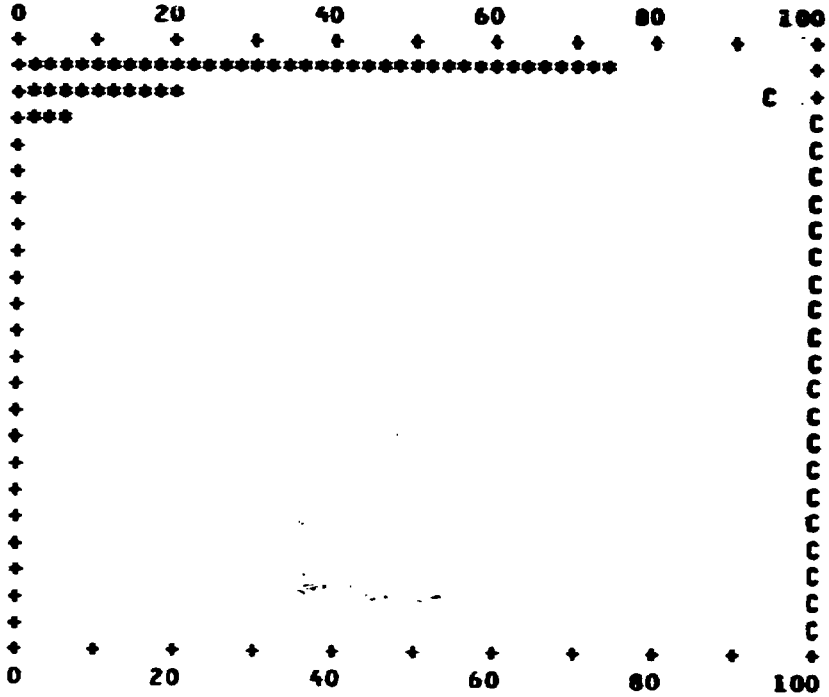


Figure 18. Histogram for master clerk queue.

HISTOGRAM NUMBER 5

LC/ QUE

OBSV FREQ	RELA FREQ	CUML FREQ	UPPER CELL LIMIT
34	1.000	1.000	1.0000
0	0.000	1.000	2.0000
0	0.000	1.000	3.0000
0	0.000	1.000	4.0000
0	0.000	1.000	5.0000
0	0.000	1.000	6.0000
0	0.000	1.000	7.0000
0	0.000	1.000	8.0000
0	0.000	1.000	9.0000
0	0.000	1.000	10.0000
0	0.000	1.000	11.0000
0	0.000	1.000	12.0000
0	0.000	1.000	13.0000
0	0.000	1.000	14.0000
0	0.000	1.000	15.0000
0	0.000	1.000	16.0000
0	0.000	1.000	17.0000
0	0.000	1.000	18.0000
0	0.000	1.000	19.0000
0	0.000	1.000	20.0000
0	0.000	1.000	21.0000
0	0.000	1.000	INF
34			

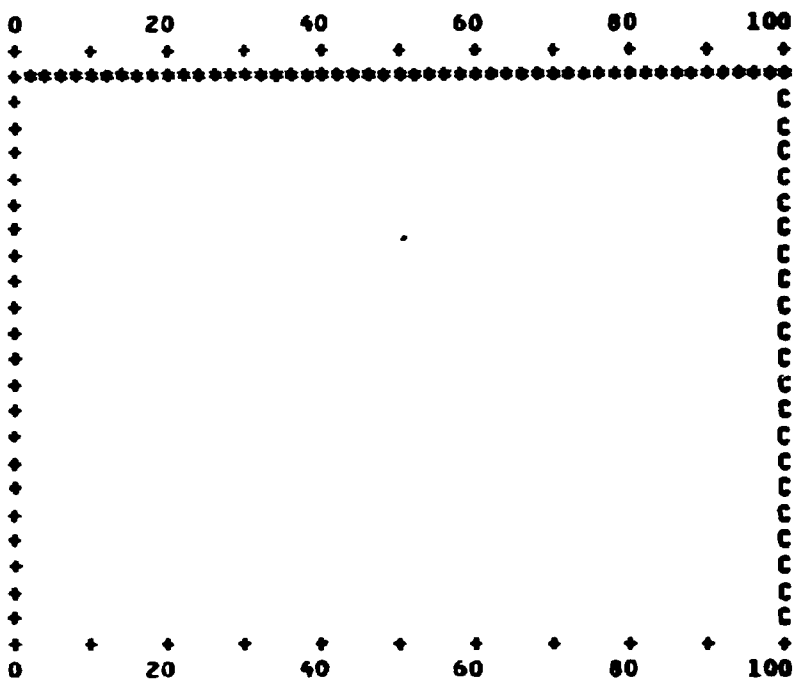


Figure 19. Histogram for locator clerk queues combined.

HISTOGRAM NUMBER 6

CKA/QUE

OBSV FREQ	RELA FREQ	CUML FREQ	UPPER CELL LIMIT
45	.352	.352	1.0000
19	.148	.500	2.0000
18	.141	.641	3.0000
10	.078	.719	4.0000
10	.078	.797	5.0000
2	.016	.813	6.0000
2	.016	.828	7.0000
2	.016	.844	8.0000
3	.023	.867	9.0000
2	.016	.883	10.0000
3	.023	.906	11.0000
4	.031	.938	12.0000
2	.016	.953	13.0000
2	.016	.969	14.0000
2	.016	.984	15.0000
1	.008	.992	16.0000
1	.008	1.000	17.0000
0	0.000	1.000	18.0000
0	0.000	1.000	19.0000
0	0.000	1.000	20.0000
0	0.000	1.000	21.0000
0	0.000	1.000	INF

128			

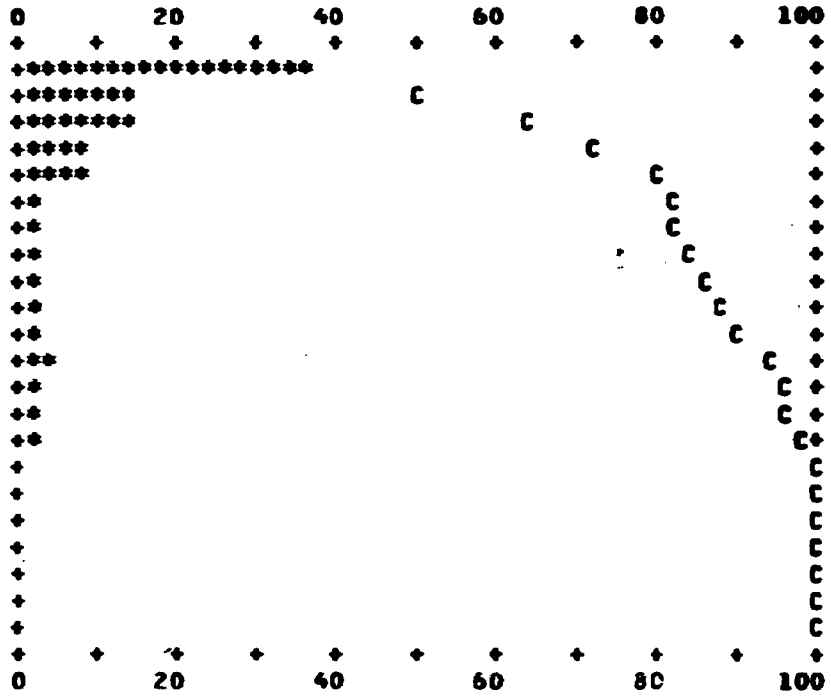


Figure 20. Histogram for checker assignment queue.

HISTOGRAM NUMBER 7

OC/ QUE

OBSV FREQ	RELA FREQ	CUML FREQ	UPPER CELL LIMIT
34	1.000	1.000	1.0000
0	0.000	1.000	2.0000
0	0.000	1.000	3.0000
0	0.000	1.000	4.0000
0	0.000	1.000	5.0000
0	0.000	1.000	6.0000
0	0.000	1.000	7.0000
0	0.000	1.000	8.0000
0	0.000	1.000	9.0000
0	0.000	1.000	10.0000
0	0.000	1.000	11.0000
0	0.000	1.000	12.0000
0	0.000	1.000	13.0000
0	0.000	1.000	14.0000
0	0.000	1.000	15.0000
0	0.000	1.000	16.0000
0	0.000	1.000	17.0000
0	0.000	1.000	18.0000
0	0.000	1.000	19.0000
0	0.000	1.000	20.0000
0	0.000	1.000	21.0000
0	0.000	1.000	INF

34			

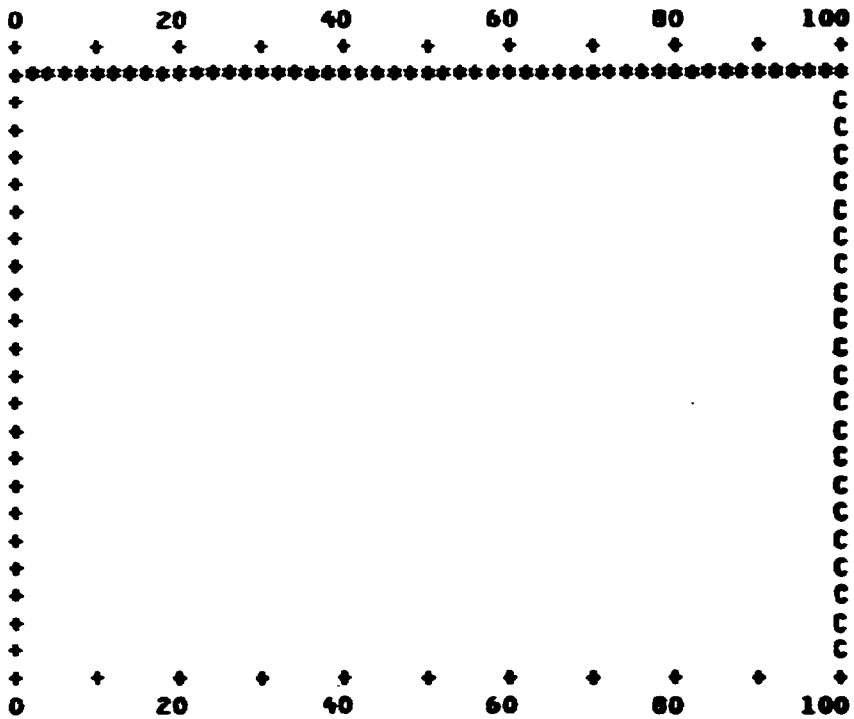
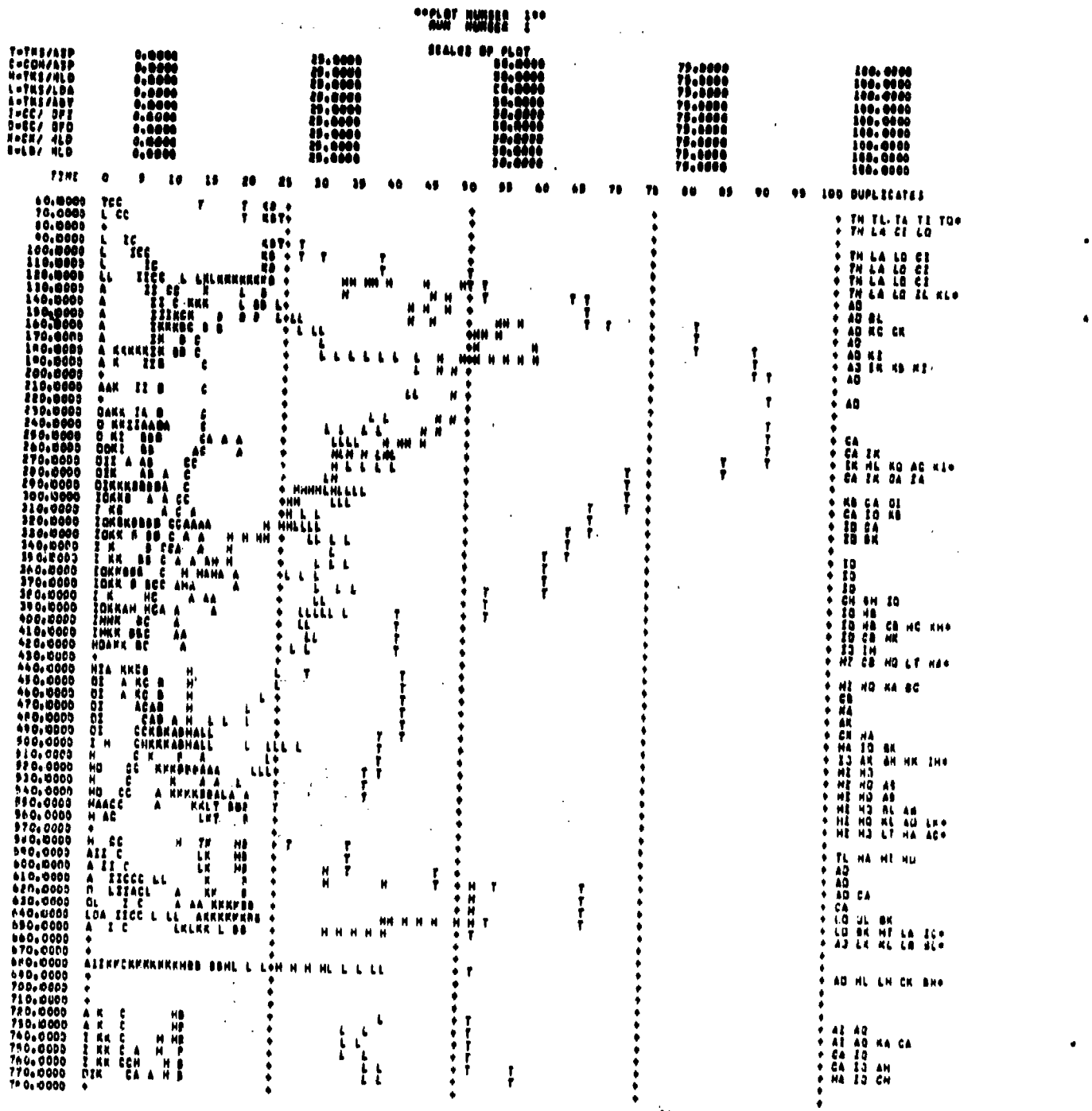


Figure 21. Histogram for outprocessing clerk queue.


PLOT NUMBER 1
RUN NUMBER 1
SCALES OF PLOT
TIME
DUPLICATES

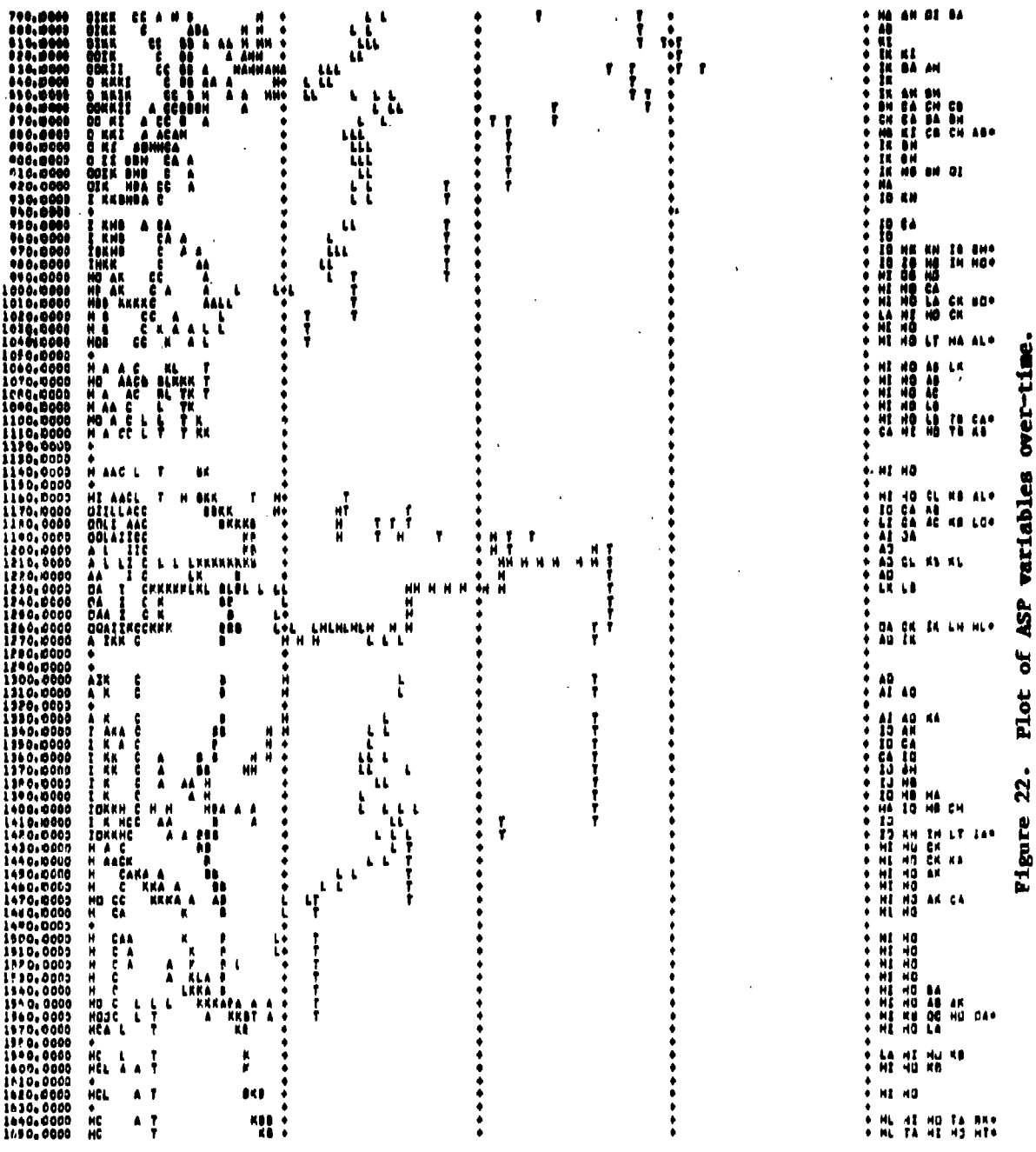


Figure 22. Plot of ASP variables over-time.

TABLE 10

Statistical Results for Observed Variables and Time-Persistent Variables

STATISTICS FOR VARIABLES BASED ON OBSERVATION

	MEAN	STD DEV	SE OF MEAN	CV	MINIMUM	MAXIMUM	OBS
ASP-W/CN	310.8450	74.2803	12.7390	.2395	0.0000	464.7579	34
ASP-A/CN	34.4720	68.7039	11.9596	1.9930	0.0000	282.1858	33
ASP-D/CN	42.2240	42.4495	7.3895	1.0053	0.0000	188.0528	33
DFI-W/CC	71.8567	22.2450	3.8150	.3096	0.0000	120.2395	34
DFI-D/MC	.9206	.6277	.3139	.6819	0.0000	1.8487	4
DFI-S/MC	2.0000	0.0000	0.0000	0.0000	0.0000	2.0000	34
DFI-D/MC	21.4263	11.5606	2.2248	.5396	0.0000	48.5422	27
DFI-S/MC	13.4118	3.9857	.6835	.2972	0.0000	19.0000	34
DFI-D/LC	15.8541	9.0812	2.0253	.5854	0.0000	36.0000	21
DFI-S/LC	29.6294	7.1485	1.2260	.2421	0.0000	40.0000	34
HLD-W/TK	104.4362	57.5931	3.6066	.5515	0.0000	245.0420	255
HLD-D/CK	10.2350	26.9211	2.3889	2.6303	0.0000	229.8180	127
LDA-W/CK	158.1384	42.5462	3.7606	.2690	0.0000	271.0970	128
LDA-D/CK	23.8653	22.1846	4.1925	.9257	0.0000	78.1229	28
LDA-S/MH	24.5695	25.8059	1.6097	1.0503	0.0000	112.7180	257
LDA-S/LB	23.2798	14.4410	.9781	.6203	0.0000	66.0000	218
LDA-TRVD	11.0439	1.3915	.0871	.1260	0.0000	13.0000	255
LDA-T/CK	63.9166	19.7972	1.7498	.3097	0.0000	99.7196	128
ABV-A/CK	11.2399	13.6540	1.2116	1.2148	0.0000	94.2842	127
ABV-W/TK	40.9633	32.1724	2.0147	.7854	0.0000	134.0862	255
DFD-W/CC	5.4559	4.1797	.7168	.7661	0.0000	12.7465	34
DFD-D/DC	2.6003	2.2366	1.2913	.8601	0.0000	5.1293	3
DFD-S/CC	5.2265	3.9598	.6791	.7576	0.0000	18.0000	34

STATISTICS FOR TIME-PERSISTENT VARIABLES

	MEAN	STD DEV	MINIMUM	MAXIMUM	TIME INTERVAL	CUR. VALUE
ASP-W/CN	6.0213	3.5755	0.0000	14.0000	1751.2638	0.0000
ASP-W/TK	43.8453	25.4478	0.0000	91.0000	1751.2638	0.0000
DFI-W/CC	1.3951	2.1118	0.0000	9.0000	1751.2638	0.0000
DFI-W/MC	.0021	.0458	0.0000	1.0000	1751.2638	0.0000
DFI-W/MC	.3393	.7900	0.0000	4.0000	1751.2638	0.0000
DFI-W/LC	.1901	.4680	0.0000	2.0000	1751.2638	0.0000
HLD-W/SP	.7213	1.6711	0.0000	5.0000	1751.2638	0.0000
HLD-W/TK	15.2069	17.5552	0.0000	65.0000	1751.2638	0.0000
LDA-W/CK	12.4399	7.5940	0.0000	28.0000	1751.2638	0.0000
LDA-W/LB	8.9218	6.5537	0.0000	23.0000	1751.2638	0.0000
LDA-W/TK	21.9738	14.4550	0.0000	43.0000	1751.2638	0.0000
LDA-W/WE	3.6056	2.8963	0.0000	11.0000	1751.2638	0.0000
LDA-W/FS	6.8867	4.9993	0.0000	19.0000	1751.2638	0.0000
ABV-W/TK	5.9646	6.0713	0.0000	25.0000	1751.2638	0.0000
DFD-W/CC	.1059	.3219	0.0000	2.0000	1751.2638	0.0000
DFD-W/DC	.0045	.0666	0.0000	1.0000	1751.2638	0.0000

TABLE 11

Statistical Results for Queue Variables

QUEUE SUMMARY TABLE

FACILITY	AVE	QUEUE	AVE WAIT	AVE SERVICE	FRACTION IDLE
INSP		4.0902	8.0107	4.0837	.0271
MANC		0.0000	.1003	2.0000	.9612
MASC		.0824	17.0150	13.4110	.7306
LOCC 1		0.0000	13.0004	27.7778	.7149
LOCC 2		0.0000	0.0000	31.0000	.7122
CRAB		3.0430	29.0226	0.0000	.0702
FSU 1		0.0000	.1000	21.3002	.0706
FSU 2		0.0000	0.0000	0.0000	1.0000
FSU 3		0.0000	0.0000	0.0000	1.0000
FSU 4		.0188	14.0704	30.0013	.4006
FSU 5		0.0000	0.0000	0.0000	1.0000
FSU 6		0.0000	0.0110	44.0209	.0210
FSU 7		0.0000	0.0000	26.7100	.0001
FSU 8		0.0000	0.0000	1.7074	.9908
FSU 9		0.0000	0.0000	0.0000	1.0000
FSU 10		0.0000	0.0000	0.0000	1.0000
FSU 11		0.0000	0.0000	0.0000	1.0000
FSU 12		0.0000	0.0000	0.0000	1.0000
FSU 13		0.0000	0.0000	20.0122	.7892
FSU 14		0.0000	0.0000	0.0000	1.0000
FSU 15		0.0000	0.0000	25.0002	.0002
FSU 16		0.0000	0.0000	0.7029	.9694
FSU 17		0.0000	0.0000	0.0000	1.0000
FSU 18		0.0000	0.0000	0.0000	1.0000
FSU 19		0.0000	0.0000	4.7100	.9784
FSU 20		0.0000	0.0000	0.0000	1.0000
FSU 21		0.0000	0.0000	16.7100	.9217
FSU 22		0.0000	0.0000	0.0000	1.0000
FSU 23		0.0000	0.0000	40.3990	.0157
FSU 24		0.0000	0.0000	0.0000	1.0000
FSU 25		.0033	3.7019	46.3017	.9437
FSU 26		0.0000	0.0000	0.0000	1.0000
FSU 27		0.0000	0.0000	0.0000	1.0000
FSU 28		0.0000	0.0000	0.0000	1.0000
FSU 29		0.0000	0.0000	0.0000	1.0000
FSU 30		0.0000	0.0000	17.9100	.9000
FSU 31		0.0000	0.0000	0.0000	1.0000
FSU 32		0.0000	0.0000	39.1100	.7499
FSU 33		0.0000	0.0000	0.0000	1.0000
FSU 34		0.0000	0.0000	7.1100	.9894
FSU 35		0.0000	0.0000	8.0203	.8672
FSU 36		0.0000	0.0000	0.0000	1.0000
FSU 37		0.0000	0.0000	0.0000	1.0000
FSU 38		0.0000	0.0000	8.7100	.9602
FSU 39		0.0000	0.0000	4.7100	.9892
FSU 40		0.0000	0.0000	8.7100	.9891
FSU 41		0.0000	3.1000	46.3017	.8338
FSU 42		0.0000	0.0000	0.0000	1.0000
FSU 43		0.0000	0.8698	72.9329	.9010
FSU 44		0.0000	0.0000	0.0000	1.0000
FSU 45		0.0000	0.0000	4.0798	.9790
FSU 46		0.0000	0.0000	0.0000	1.0000
FSU 47		0.0000	0.0000	0.0000	1.0000
FSU 48		0.0000	0.0000	0.0000	1.0000
FSU 49		0.0000	0.0000	0.0000	1.0000
FSU 50		0.0000	0.0000	0.0000	1.0000
FSU 51		0.0000	0.0000	0.0000	1.0000
FSU 52		0.0000	0.0000	0.0000	1.0000
FSU 53		0.0000	0.0000	0.0000	1.0000
FSU 54		0.0000	0.0000	0.0000	1.0000
FSU 55		0.0000	0.0000	0.0000	1.0000
NHE 1		0.0000	0.0000	31.7128	.7284
NHE 2		0.0000	0.0000	42.6320	.6093
NHE 3		0.0000	0.0000	10.9491	.8178
NHE 4		0.0000	0.0000	9.1990	.9827
NHE 5		0.0000	0.0000	3.3283	.9810
NHE 6		0.0000	0.0000	39.8745	.8178
NHE 7		0.0000	0.0000	4.7100	.9786
NHE 8		0.0000	0.0000	16.7100	.9237
NHE 9		0.0000	0.0000	40.3990	.8157
NHE 10		0.0000	0.0000	96.7100	.7238
NHE 11		0.0000	0.0000	10.9827	.8749
NHE 12		0.0000	0.0000	40.7100	.9838
NHE 13		0.0000	0.0000	11.0258	.8604
NHE 14		0.0000	0.0000	11.9100	.7620
NHE 15		0.0000	0.0000	7.7100	.9824
NHE 16		0.0000	0.0000	7.7100	.9478
NHE 17		0.0000	0.0000	61.8067	.7782
NHE 18		0.0000	0.0000	4.0999	.9819
NHE 19		0.0000	0.0000	71.0699	.7123
NHE 20		0.0000	0.0000	23.4383	.8978
NHE 21		0.0000	0.0000	47.8423	.6772
NHE 22		0.0000	0.0000	31.6293	.8364
NHE 23		0.0000	0.0000	14.4619	.8990
NHE 24		0.0000	0.0000	43.0786	.6198
JUTC		0.0000	.2894	9.2969	.4989

A study of the intermediate program printout shows that the issue operations are completed within 25 hours starting with the arrival of the first convoy in the 24-hour simulation. The statistics listed in Table 10 shows that a convoy arrives at the ASP on an average of every 34 minutes and one departs every 42 minutes. The mean number of convoys within the ASP is 6.0 and the average time that a convoy stays within the ASP is 310 minutes. The mean number of trucks within the ASP is 43.1

The mean number of convoy commanders in the inprocessing office is 1.4 and the average time within the office is 72 minutes. The average TR-service time is 2 minutes by the head clerk, 13.4 minutes by the master file clerk, and 29.5 by the locator file clerks. The mean number of TR's in the master clerk queue is 0.33, while those in the locator clerk queue is 0.19. The average stay time in the queues is 21 minutes and 16 minutes, respectively. Table 11 and Figures 17 through 19 show that the average queue length at the arrival of the next TR to be serviced is close to zero for the head clerk and locator clerks, but nearly equal to one for the master file clerk. The clerk positions are idle 96.1 percent of the time for the head clerk, 73.9 for the master file clerk and 71.3 for the locator clerks.

The mean number of trucks in the holding area is 15, and the average stay time is 104 minutes. The average time for inspection is 4.95 minutes. The mean number of inspectors busy is 0.72. The average queue length upon arrival of the next truck to be inspected is 4.89, and the average wait time is 5.8 minutes. The inspection facility is idle 82.7 percent of the time.

The average number of checker assignments is 3.84 while the average wait time for a checker assignment is 30 minutes. The assignment queue is empty only 67.0 percent of the time. The average time between checker departures from the holding area is 10 minutes. The average time between arrivals at the assembly area is 11 minutes. The average number of checkers in the holding area is 12 while the average laborers is 11.

The mean number of checkers in the loading area is 12. The average time that a checker is within the loading area is 158 minutes. Of this time, 64 minutes are spent traveling between loading points (average travel distance is 11 kilometers). The average loading time by MHE's is 24.6 minutes while the labor-service time is 23 minutes. The mean number of laborers in the loading area is 8.9. Roughly one-third of the checkers spent an average of 22 minutes in queue waiting for MHE service. The mean number of trucks in the loading area is 21.9 while the mean number of MHE's loading the trucks is 3.6, and the mean number of active FSU's are 6.9. Table 11 shows the usage statistics for each MHE and FSU in the simulation.

The mean number of trucks in the assembly area is 6.0. The average time spent in the area is 41.0 minutes. The mean number of convoy commanders in the outprocessing office is 0.1 persons. The average time within the office is 5.2 minutes.

RECOMMENDATIONS FOR FURTHER RESEARCH

The following is recommended for further research:

1. The computer model could be expanded to include ammunition receipt operations and the DAO clerical operations.

2. The model assumes that all MHE's assigned to the ASP are operational during the simulation. The effect of MHE downtime and maintenance should be included.

3. The model assumes no changes in personnel performance with simulation time. The effect of fatigue and the change in performance with mission demand (i.e., service queue lengths) should be included.

4. The model could be improved by generalizing the ASP inprocessing and outprocessing office operations to other than commodity load demand.

5. An non-hostile tactical environment is assumed for the ASP operations. The possibility of adverse tactical environments; i.e., enemy rocket or air strikes, forces us to consider the deployment of the ASP into ATP sub-units. The simulation model could be used to study the effects of different assignments in personnel, equipment and doctrine upon mission performance.

6. One interesting application of the simulation model that should be investigated further, is the use of the model and computer-driven graphic displays for training candidate ammunition officers. The trainee could use the displays to specify a deployment of the ASP on the terrain, assign equiment and personnel to tasks, and then use the simulation model to evaluate his proposed solution.

CONCLUSION

A computer-simulation program model has been developed for the issue operations of an Ammunition Supply Point (ASP). The model would be useful in the study of the effects of changes in personnel, organization and equipment upon ASP mission performance. The model simulates the TOE 9-38-H3 Ammunition Company in support of (one-half) a reinforced Armored Division during a determined defense. The ASP layout follows the USAMMCS school solution. The simulation program is written in the Fortran language and uses the GASP simulation programs. Statistics have been included for the evaluation of mission performance.

REFERENCES

1. Department of the Army. Conventional ammunition unit operations (FM 9-38), with Change 1, 23 March 73, and Change 2, 10 September 76: HQ DA, June 1970.

2. Mackey, D.S., & Davall, B.M. Human Engineering Laboratory test of paperwork processing within the ammunition supply point office for ammunition issue (Letter Report No. 278). Aberdeen Proving Ground, MD: USA Human Engineering Laboratory, March 1980.

3. Pritsker, A.A.B. The GASP IV simulation language. NY: John Wiley & Sons, 1974.

APPENDIX A

PROGRAM VARIABLES

Program Variables

The variable of the user's program are held in the non-GASP labelled common. The variables determine the characteristics of the ASP and describe the status of the simulation. The common block label areas and the associated variables are listed below:

1. UNITS - common block area variables describe the units supported by the ASP:

   (a) NUNIT, number of units supported by ASP.

   (b) ATITLE, unit nomenclature.

   (c) DGO, distance from unit to ASP via DAO.

   (d) DRTN, return distance from ASP to unit.

   (e) IRSP, roadway speed statistic index.

   (f) ILSP, unit departure time statistic index.

2. BASIC - variables describe the unit's commodity load:

   (a) NBT, number of trucks in the basic load.

   (b) ATKB, type of truck.

   (c) NLB, number of lines on truck chit-sheet.

   (d) ADODB, stock line nomenclature.

   (e) ATYPB, unit of quantity.

   (f) XQTYB, quantity of stock line carried by truck.

3. OFCT - variables are the service time statistics indexes of master file clerk and locator file clerk for inprocessing each unit.

   (a) IATMC, master file clerk service time statistics index.

   (b) IATLC, locator clerk service time statistics index.

4. OFCK - variables are the checker and laborer assignments and the store-slip made up for each unit:

   (a) NCK, number of checker assignments for unit.

   (b) NLBX, number of laborers traveling with checker.

(c) NTK, number of trucks with checker.

(d) ITK, identity of each truck with checker.

(e) NSP, number of loading stops made by checker.

(f) NFSX, identity of FSU for each stop.

(g) NTPX, number of pallet loaded at each stop.

(h) AQTX, pallet stock-line nomenclature.

(i) NBX, number of boxes loaded at stop.

(j) NLX, number of loaders (laborers, drivers and checker) used to load boxes at stop.

5. DEMAND - variables describe the using unit convoy arriving at the ASP:

(a) NS, the number of convoys in the scenerio.

(b) AT, the arrival time of each convoy at the ASP.

(c) AUNIT, unit-nomenclature of convoy.

(d) NT, the number of trucks in each convoy.

(e) ATK, the type of each truck in the convoy.

(f) NL, the number of line items for each truck.

(g) ADOD, the DODC-number of each line item for truck.

6. LOAD - variables describe the load of each truck in the convoy:

(a) ATYP, quantity-unit for line-item.

(b) XQTY, quantity of line item.

7. HOLDA - variables describe the vehicles in the holding area:

(a) NIQ, number of vehicles in inspection waiting queue.

(b) NIC, convoy of vehicles in inspection queue.

(c) NIT, convoy-number of vehicle in inspection queue.

8. INSP - variables describe inspectors in holding area:

(a) NIQ, total number of safety inspectors.

(b) NIS, number of inspectors inspecting vehicles.

(c) MISC, convoy of vehicles being inspected by inspector.

(d) NIST, convoy-number of vehicles being inspected.

9. HQAR - variables describe the holding area-to-office and assembly area-to-office distances and speeds:

(a) DOA, distance from holding area to operations office.

(b) DOS, distance from assembly area to operations office.

(c) IOC, convoy commander speed statistical index.

(d) ICK, checker speed statistical index.

10. CLERKS - variables describe the status of the inprocessing office clerks:

(a) NCH, number of TR's in head clerk queue.

(b) NQH, head clerk busy flag.

(c) NSH, convoy of TR's by position in queue.

(d) NCM, number of TR's in master clerk queue.

(e) NQM, master clerk busy flag.

(f) NSM, convoy of TR's by position in queue.

(g) NCL, number of TR's in locator file clerk queue(s).

(h) NQL, locator file clerk busy flag.

(i) NSL, convoy of TR's by position in queue.

11. STATUS - variables indicate inspection and inprocessing status for each truck in scenario:

(a) ISP, inspection indicator for truck.

(b) ISS, inprocessing indicator for truck.

12. STOCKS - variables describe the office master file cards.

(a) NSL, number of line-items in master file.

(b) ADODC, DODC-number of each line item.

(c) XLIO, quantity of line item in stockage.

(d) XLIR, line item reorder point.

(e) NLIF, line item reorder flag.

(f) XLBRD, pound per box of line item.

(g) XRDBX, rounds per box.

(h) XBXPL, rounds per pallet.

13. SITES - variables describe the site layout and the distribution of the stockage:

(a) DST, roadway distances among the holding area, the FSU's in the magazine sections, and the assembly area.

(b) IASP, ASP roadway speed statistic index.

(c) NFSU, number of FSU's in magazine section shown on locator card.

(d) NSTACK, number of stacks in each FSU.

(e) ADODX, DODC-number of line item stored in stacks.

(f) ALOTX, lot number of item stored in stacks.

(g) XSQTY, quantity of items stored in stacks.

14. REORD - variable, ITROX, is the reorder time statistics index.

15. STORES-VARIABLES - variables describe the store slips for each truck made out by the inprocessing office:

(a) NLIP, number of stops on store slip for truck.

(b) IFSU, FSU at truck stop.

(c) ISTC, stack within FSU at stop.

(d) XLQTY, quantity of items to be picked up at stop.

16. CKASG - variables describe the checker assignment queue.

(a) NCA, number of checker assignments in queue.

(b) NCT, convoy of trucks in assignment.

(c) NCI, convoy unit number in OFCK file (see Item 4).

(d) NCC, checker number in OFCK file for unit.

(e) NTC, number of trucks in assignment.

(f) NCTT, identity of trucks in assignment.

(g) NLTT, number of laborers in assignment.

17. CHECKER - variables describe the status of the checker personnel:

(a) NGO, total number of checkers assigned to issue operations.

(b) NGH, number of checkers out on pickup.

(c) NGC, convoy of the trucks with a checker on pickup.

(d) NGCT, convoy unit number in OFCK file (Item 4) for trucks with checker.

(e) NGT, checker number in OFCK file for unit.

(f) NGL, MHE use indicator at stop.

(g) NGS, loader use indicator at stop.

18. LABOR - variables describe the status of the laborers:

(a) NHO, total number of laborers assigned to issue operations.

(b) NHL, number of laborers idle.

(c) IRLOAD, labor loading rate statistics index.

19. NMHE - variables describe the status of the MHE's assigned to issue operations:

(a) NMHEO, total number of MHE's on hand.

(b) IMHE, MHE busy flag.

(c) NMHF, number of MHE's assigned to a FSU.

(d) IMHF, identity of MHE's assigned to FSU.

(e) NTYP, type of MHE.

(f) IRMHE, MHE loading rate statistical index as a function of the MHE type, the truck type and the line item type.

(g) IDKE, number of pallet line item in MHE loading information.

(h) ADKE, DODC number of pallet line item.

20. PADS - variables describe the checker queues at the FSU's waiting for MHE service:

(a) NQP, number of checkers in queue.

(b) NPC, identity of checker by queue portion.

(c) NPS, stops number for checker on store slip.

21. CONVOY - variables describe the convoy assembly area:

(a) NQTO, number of trucks in assembly area for a convoy.

(b) NQT, total number of trucks in assembly area.

22. OUTPUT - variables describe the outprocessing office:

(a) NGO, outprocessing clerk busy flag.

(b) NQO, number of TR's in outprocessing service queue.

(c) NOC, convoy of TR's by queue position.

APPENDIX B

COMPUTER PROGRAM

Computer Program

The computer program used for the issue simulation is attached below. The program is written in the FORTRAN IV programming language for the CDC 7500 computer system here at the US Army Aberdeen Proving Ground facilities. The program calls upon the GASP IV set of routines which is a part of the supporting programs available. The subroutines supplied by the user in the form of this program are described below:

1. ASP - main program which calls upon the GASP supporting routine to start the simulation.

2. INTLC - subroutine called by the GASP routine to read in the ASP characteristics and the initial conditions of the issue scenario.

3. PLAC - places time event in GASP reference file along with reference information such as event class coding and event identification.

4. EVNTS - called by GASP routine to process next event in event file according to event class coding.

5. LVUNIT - computes time convoy leaves unit and when it arrives at ASP. Called by EVNTS (Event 1).

6. QHOLD - adds using unit's convoy to holding area. Called by EVNTS upon arrival of convoy at the ASP (Event 2).

7. INSP - processes inspection of vehicles. Called by EVNTS at completion of inspection (Event 3).

8. ISRO - adds convoy commander to inprocessing at operations office. Called by EVNTS upon arrival of convoy commander at inprocessing office (Event 4).

9. CCTOS - adds TR to master clerk service at completion of that of head clerk. Called by EVNTS (Event 5).

10. MCTOS - adds TR to locator clerk service at completion of that of master clerk. Called by EVNTS (Event 6).

11. LCTOS - completes and updates locator clerk service. Called by EVNTS at completion of locator clerk service (Event 7).

12. CKFUNC - adds to checker assignment queue at completion of locator clerk service. Called by LCTOS.

13. CASSP - releases checker from holding area with trucks if trucks have been inspected, store slips are completed, and checkers and laborers are available. Called by INSP, LCTOS and CKSRO.

14. TASSP - computes travel time of checker to first stop from holding area. Called by EVNTS upon release of checker from holding area (Event 8).

15. TCRPD - adds truck to magazine loading service. Called by EVNTS upon arrival of truck at magazine (Event 9).

16. TCLPD - finds next stop for checker and computes travel time. Called by EVNTS upon completion of truck loading by magazine (Event 10).

17. TACBA - called by EVNTS upon arrival of truck at vehicle assembly area (Event 11). Forwards checker and laborers to operations office. If complete convoy is in assembly area, the convoy commander is sent to the outprocessing section of the operations office.

18. CKSRO - checks checker-assignment queue for release of trucks to loading area upon return of checkers and laborers. Called by EVNTS (Event 12).

19. COSRO - adds convoy C.O. to outprocessing service at arrival of C.O. at office from assembly area. Called by EVNTS (Event 13).

20. COCMP - releases convoy from ASP. Called by EVNT at completion of outprocessing (Event 14).

21. RELCV - computes convoy return time to unit. Called by EVNT at release of convoy (Event 15).

22. REORD - subroutine computes in-shipment delivery amount and time of arrival of shipment convoy. Called by SSLIP when reorder point is reached in line item inventory.

23. SUPPL - subroutine updates stock inventory records upon receipt of shipment. Called by EVNTS upon arrival of shipment convoy (Event 16).

24. OTPUT - computes queue summary statistics at completion of simulation. Called by GASP.

25. Subroutines used in conversions:

MISC
FDUNIT
CONV
GTMC
GQTY
GTLC

26. Subroutines used in statistical bookkeeping during the simulation:

GPLOTX
EAVT
TIMS
WCOLC
COLC
QSTAT

27. The following are GASP subroutines (slightly modified for our purposes) or functions:

GASP
TIMST
DRAND
RNORM
COLCT
GPLOT
HISTO

28. The data file contains the following:

a. The control data used to initialise the supporting GASP routines; and,

b. The data specifying the size and characteristics of the ASP, and the initial scenario to be simulated.

```
SMYTH,STMFI,T1000,MS260090.
ACCOUNT,HE***.
MAP,ON.
FTN(R=3,PL=20000,LCM=I).
LGO.
      PROGRAM ASP(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT)
C
C
C PROGRAM SIMULATES AMMO STORAGE POINT (ASP) IN FORTRAN AND GASP IV
      DIMENSION NSET(20000)
      COMMON QSET(20000)
      COMMON/GCOM1/ATRIB(25),JEVNT,MFA,MFE(100),MLE(100),MSTOP,
     QNCRDR,NNAPQ,NNAPT,NNATR,NNFIL,NNQ(100),NNTRY,NPRNT,
     QPPARM(200,4),TNOW,TTBEG,TTCLR,TTFIN,TTRIB(25),TTSET
      EQUIVALENCE(NSET(1),QSET(1))
      LEVEL 2, ATRIB
C SET CARD READER NUMBER AND PRINTER NUMBER
      NCRDR=5
      NPRNT=6
      CALL GASP
      STOP
      END
      SUBROUTINE INTLC
C SUBROUTINE INITIALIZES SCENERIO; CALLED BY GASP SUBROUTINE
C           GASP COMMON AREAS
      COMMON/GCOM1/ATRIB(25),JEVNT,MFA,MFE(100),MLE(100),MSTOP,NCRDR,
     QNNAPQ,NNAPT,NNATR,NNFIL,NNQ(100),NNTRY,NPRNT,
     QPPARM(200,4),TNOW,TTBEG,TTCLR,TTFIN,TTRIB(25),TTSET
      COMMON/GCOM4/DTPLT(10),HHLOW(25),HHWID(25),IICRD,IITAP(10),JJCEL
     1(500),LLABC(25,2),LLABH(25,2),LLABP(11,2),LLABT(25,2),LLPHI(10),LL
     2PLQ(10),LLPLT,LLSUP(15),LLSYM(10),MMPTS,NNCEL(25),NNCLT,NNHIS,NNPL
     3T,NNTPS(10),NNSTA,NNVAR(10),PPHI(10),PPLQ(10)
      COMMON/GCOM6/EENQ(100),IINN(100),KKRNK(100),MMAXQ(100),QQTIM(100
     1),SSOBV(25,6),SSTPV(25,6),VVNQ(100)
      COMMON/GCOM9/IIEVT,IISED(6),JJBEG,JJCLR,MMNIT,MMON,NNAME(3),NNCF
     QI,NNDAY,NNPPT,NNSET,NNPRT,NNPRM,NNRNS,NNRUN,NNSTR,NNYR,SSEED(6)
C           NON-GASP COMMON AREAS
      COMMON/UNITS/NUNIT,ATITLE(20),DGO(20),DRTN(20),IRSP,ILSP
      COMMON/BASIC/NBT(20),ATKB(20,15),NLB(20,15),ADODB(20,15,20),ATYPB(
     Q20,15,20),XQTYB(20,15,20)
      COMMON/OFCT/IATMC(20),IATLC(20)
      COMMON/OFCK/NCK(20),NLBX(20,10),NTK(20,10),ITK(20,10,5),NSP(20,10)
     Q,NFSX(20,10,10),NPTX(20,10,10),AQTX(20,10,10),NBX(20,10,10),
     QNLX(20,10,10)
C NUNIT, NUMBER OF UNITS SUPPORTED BY ASP
C ATITLE, INDIVIDUAL NOMENCLATURE
C DGO, DISTANCE FROM UNIT TO ASP VIA DAO
C DRTN, DISTANCE FOR RETURN TO UNIT FROM ASP
C IRSP, ROAD TRAVEL SPEED STATISTIC INDEX
C ILSP, UNIT DEPARTURE TIME STATISTIC INDICATOR
C NBT, NUMBER OF TRUCKS IN BASIC LOAD
C ATKB, TYPE OF TRUCK
C NLB, NUMBER OF LINES ON CHIT SHEET CARRIED BY TRUCK
C ADODB, NOMENCLATURE OF STOCK LINE CARRIED BY TRUCK
C ATYPB, UNIT OF QUANTITY CARRIED BY TRUCK
C XQTYB, QUANTITY OF STOCK LINE CARRIED BY TRUCK
C IATMC, AVEAAGE TIME STATISTIC INDICATOR FOR T.O. PROCESSING BY MASTER
C FILE CLERK
C IATLC, AVERAGE PROCESSINF TIME STATISTIC INDICATOR FOR LOCATOR FILE CL
C NCK, NUMBER OF CHECKER ASSIGNMENTS FOR USING UNIT
C NLBX, NUMBER OF LABORERS TRAVELING WITH CHECKER
C NTK, NUMBER OF TRUCKS WITH CHECKER
C ITK, IDENTITY OF EACH TRUCK WITH CHECKER
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C NSP, NUMBER OF LOADING STOPS MADE BY CHECKER
C NFSX, IDENTITY OF FSU FOR EACH STOP
C NTPX, NUMBER OF PALLETS LOADED AT EACH STOP
C AQTX, PALLET LINE ITEM NUMBER LOADED AT STPO
C NBX, NUMBER OF BOXES LOADED
C NLX, NUMBER OF LOADERS( LABORERS, DRIVERS, AND CHECKER)
      COMMON/HOLDA/NIQ,NIC(100),NIT(100)
C NIQ, NUMBER OF VEHICLES IN INSPECTION WAITING QUEUE
C NIC, CONVOY THAT VEHICLE IN WAITING QUEUE IS PART OF
C NIT, CONVOY TRUCK THAT VEHICLE IN WAITING QUEUE IS PART OF
      COMMON/INSP/NIO,NIS,NISC(5),NIST(5)
C NIO, TOTAL NUMBER OF SAFETY INSPECTORS AVAILABLE
C NIS, NUMBER OF INSPECTORS PRESENTLY INSPECTING VEHICLES
C NISC, CONVOY BEING INSPECTED BY THAT INSPECTOR
C NIST, CONVOY TRUCK BEING INSPECTED BY THAT INSPECTOR
      COMMON/HQAR/DOA,DOS,IOC,ICK
C DOA, DISTANCE FROM HOLDING AREA TO OPERATIONS OFFICE
C DOS, DISTANCE FROM ASSEMBLY AREA TO OPERATIONS OFFICE
C IOC, INDEX FOR CONVOY C.O. SPEED STATISTICS FOR TRAVEL
C ICK, INDEX FOR CHECKER SPEED STATISTICS
      COMMON/DEMAND/NS,AT(50),AUNIT(50),NT(50),ATK(50,15),NL(50,15),
     QADOD(50,15,20)
      COMMON/LOAD/ATYP(50,15,20),XQTY(50,15,20)
C NS, NUMBER DEMANDING SERVICE IN SCENERIO
C AT, TIME OF DEPARTURE OF USSR-CUSTOMER FROM HIS UNIT-AREA
C AUNIT, NOMENCLATURE OF CUSTOMER-UNIT
C NT, NUMBER OF TRUCKS IN CUSTOMER-CONVEY
C ATK, TRUCK TYPE FOR EACH TRUCK IN CONVOY
C NL, NUMBER OF LINE ITEMS REQUESTED FOR TRUCK
C ADOD, DODC NUMBER OF EACH LINE TYPE REQUESTED FOR TRUCK
C ATYP, LOADING UNIT FOR LINE TYPE
C XQTY, QUANTITY DEMANDED FOR LOADING ON TRUCK
      COMMON/CLERKS/NCH,NQH,NSH(100),NCM,NQM,NSM(100),NCL(2),NQL(2),NSLL
     Q(2,100)
C NCH, NUMBER OF CUSTOMERS IN SRO-HEAD CLERK QUEUE
C NQH, HEAD CLERK BUSY FLAG
C NSH, RANK ORDERING OF CUSTOMERS IN QUEUE BY POSITION
C NCM, NUMBER OF CUSTOMERS IN MASTER FILE CLERK QUEUE
C NQM, MASTER FILE CLERK BUSY FLAG
C NSM, RANK ORDERING OF CUSTOMERS IN QUEUE
C NCL, NUMBER OF CUSTOMERS IN LOCATOR FILE CLERK QUEUE
C NQL, LOCATOR FILE CLERK BUSY FLAG
C NSLL, RANK ORDERING OF CUSTOMERS IN QUEUE BY POSITION
      COMMON/STATUS/ISP(50,15),ISS(50,15)
C ISP, INSPECTION INDICATOR FOR CONVOY-TRUCK
C ISS,STORE-SLIP INDICATOR FOR CONVOY-TRUCK
      COMMON/STOCKS/NSL,ADODC(200),XLIO(200),XLIR(200),NLIF(200)
     Q,XLBRD(200),XRDBX(200),XBXPL(200)
C NSL, NUMBER OF STOCKAGE LINE ITEMS IN MASTER FILE
C ADODC, DODC NUMBER OF EACH LINE ITEM
C XLIO, QUANTITY OF LINE ITEM IN STOCKAGE
C XLIR, LINE ITEM REORDER POINT
C NLIF, LINE ITEM REORDER FLAG
C XLBRD, POUNDS PER BOX
C XRDBX, ROUNDS PER BOX
C XBXPL, ROUNDS PER PALLET
      COMMON/SITES/DST(60,60),IASP,NFSU,NSTACK(60),ADODX(60,20),
     QALOTX(60,20),XSQTY(60,20)
C DST, ROAD-DISTANCE BETWEEN HOLDING AREA, SECTION FSU'S, AND
C ASSEMBLY AREA
C IASP, ASP-ROADWAY TRAVEL SPEED STATISTIC INDEX
C NFSU, NUMBER OF FSU'S IN SECTION OF ASP SHOWN BY LOCATOR CARDS
C NSTACK, NUMBER OF STACKS IN EACH FSU
C ADODX, DODC NUMBER OF ITEMS STORED IN STACK
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C ALOTX, LOT NUMBER OF ITEMS STORED IN STACK
C XSQTY, QUANTITY OF ITEMS STORED IN STACK
      COMMON/RECORD/ITROX
C ITROX, REORDER TIME STATISTICS INDEX
      COMMON/STORES/NLIP(50,15),IFSU(50,15,20),ISTC(50,15,20)
      COMMON/STOREL/XLQTY(50,15,20)
C NLIP,NUMBER OF STOPS ON STORE SLIP FOR CONVOY TRUCK
C IFSU, FSU FOR TRUCK STOP
C ISTC,STACK OF TRUCK STOP
C XLQTY, QUANTITY OF ITEMS TO BE PICKED UP AT TRUCK STOP
      COMMON/CKASG/NCA,NCT(100),NCI(100),NCC(100),NTC(100),NCTT(100,5),N
     QLTT(100)
C NCA, NUMBER OF CHECKER ASSIGNMENTS PRESENTLY IN QUEUE
C NCT, CONVOY OF TRUCKS IN ASSIGNMENT
C NCI, CONVOY UNIT DESIGNATION BY FILE NUMBER
C NCC, NUMBER OF CHECKER IN UNIT OFFICE FILE
C NTC, NUMBER OF TRUCKS IN ASSIGNMENTS
C NCTT, CONVOY-TRUCKS IN ASSIGNMENTS
C NLTT, NUMBER OF LABORERS IN ASSIGNMENT
      COMMON/LABOR/NHO,NHL,IRLOAD
C NHO, TOTAL NUMBER OF LABORERS ASSIGNED TO INPROCESSING
C NHL, NUMBER OF LABORERS PRESENTLY IDLE IN LABOR POOL
C IRLOAD, LABORER LOADING RATE STATISTICAL INDICATOR (BOXES MOVED PER MI
      COMMON/CHECKER/NGO,NGH,NGC(20),NGCT(20),NGT(20),NGL(20),NGS(20)
C NGO, TOTAL NUMBER OF CHECKERS ASSIGNED TO INPROCESSING
C NGH, NUMBER OF CHECKERS PRESENTLY ASSIGNED TO PICKUP
C NGC, CONVOY OF TRUCKS ASSIGNED TO PICKUP
C NGCT, CONVOY UNIT DESIGNATOR NUMBER
C NGT, CHECKER NUMBER IN UNIT OFFICE FILE
C NGL, MHE USE INDICATOR AT LOADING STOP
C NGS, LOADER USE INDICATOR AT STOP
      COMMON/NMHE/NMHEO,IMHE(30),NMHF(60),IMHF(60,5),
     QNTYP(30),IRMHE(5,9,20),IDKE,ADKE(200)
C NMHEO, TOTAL NUMBER OF MHE'S ON HAND
C IMHE, MHE BUSY DISPOSITION FLAG
C NMHF, NUMBER OF MHE'S ASSIGNED TO FSU
C IMHF, MHE ASSIGNED TO FSU
C NTYP, MHE TYPE
C IRMHE, MHE LOADING RATE STATISTIC INDICATOR (PALLETS MOVED PER MINUTE)
C BY MHE TYPE, TRUCK TYPE AND DODC TYPE
C IDKE, NUMBER OF PALLET LINE ITEM LOADING INFO +1
C ADKE, DODC NUMBER OF PALLET LINE ITEM  WITH LOADING INFO
      COMMON/PADS/NQP(60),NPC(60,100),NPS(60,100)
C NQP, NUMBER OF CHECKERS IN MHE SERVICE QUEUE
C NPC, IDENTITY OF CHECKER BY POSITION IN QUEUE
C NPS, STOP NUMBER ON CHECKER STORE SLIP
      COMMON/CONVOY/NQTO(100),NQT
C NQTO, NUMBER OF TRUCKS ASSIGNED TO CONVOY THAT ARE PRESENTLY IN
C ASSEMBLY AREA
C NQT, TOTAL NUMBER OF TRUCKS IN CONVOY ASSEMBLY AREA
      COMMON/OUTPUT/NGO,NQO,NOC(100)
C NGO, SRO OUT-PROCESSING DISPOSITION FLAG
C NQO, NUMBER OF CUSTOMERS IN OUT-PROCESSING SERVICE QUEUE
C NOC, RANK ORDERING OF CUSTOMERS BY POSITION IN SERVICE QUEUE
      COMMON/ATIME/ITIV,ITIA,ITA,ITIE,ITIL,ITBO,ITRO
C ITIV, VEHICLE SAFETY INSPECTION TIME STATISTICS INDICATOR
C ITIA, HEAD CLERK FOR SRO INPROCESSING SERVICE TIME
C ITA, CHECKER DISPATCH ON ROAD FROM HOLDING AREA
C ITIE, MHE AVERAGE SETUP TIME TO START LOADING
C ITIL, AVERAGE SETUP TIME FOR MANUAL LABOR
C ITBO, OUTPROCESSING SEVICE BASELINE TIME
C ITRO, OUTPROCESSING CLERK INCREMENTAL SERVICE PER LINE ITEM
      COMMON/STAT/NQS,AQS(200),NNS(200),NSQ(200),TSS(200),TES(200),
     QIQS(200),TSD(200),TED(200),TSW(200),TEW(200)
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C NQS, NUMBER OF QUEUE SERVICE STATIONS
C AQS, NOMENCLATURE OF QUEUE SERVICE STATION
C NNS, TOTAL NUMBER SERVICED BY SERVICE STATION
C NSQ, TOTAL OF NUMBERS IN QUEUE AS CUSTOMER ARRIVES
C TSS, TOTAL OF SERVICE TIME STARTS FOR CUSTOMERS
C TES, TOTAL OF SERVICE TIME ENDS FOR CUSTOMERS
C TSD, TOTAL OF SERVICE IDLE TIME STARTS
C TED, TOTAL OF SERVICE IDLE TIME ENDS
C TSW, TOTAL OF WAIT TIME START FOR CUSTOMER
C TEW, TOTAL OF WAIT TIME END FOR CUSTOMER
      COMMON/TAVE/NQV,NQVE(20),AQVE(20,2)
C NQV, TOTAL NUMBER TIME PERSISTENT STATISTICS
C NQVE, VALUE OF STATISTIC, TRUCKS IN HOLDING AREA, T.O. INPROCESSING
C OFFICE,TRUCKS IN ASP PROPER, TRUCKS IN VEH ASSY AREA, T.O. OUT PROC
C AQVE, STATISTIC NOMENCLATURE
      COMMON/BAVE/NOV,ANM(25),ISN(25),AOVE(25,2)
C NOV, TOTOAL NUMBER OF OBSERVED STATISTICS
C ANM, VALUE OF OBSERVED STATISTIC
C  ISN, OBSERVED STATISTIC SWITCH
C AOVE, NOMENCLATURE
      COMMON/PLOT/XNP(10)
      COMMON/WCOL/LAQ(100),LAS(100),NME(100),TIE(100,50)
      COMMON/DCOLC/ISDX(510),DSTXC(510)
      COMMON/TCOLC/ISDT(50),TSST(50)
      COMMON/OPNS/TDUSK,TDAWN,ISDAY
      LEVEL 2, ATRIB
      LEVEL 2, NS
      LEVEL 2, ATYP
      LEVEL 2, NLIP
      LEVEL 2, XLQTY
      LEVEL 2, NCK
      LEVEL 2, NBT
      LEVEL 2, DST
      LEVEL 2, NQP
      LEVEL 2, NQS
      LEVEL 2, DTPLT
      LEVEL 2, EENQ
C          INITIALIZE NON-GASP VARIABLES
      DIMENSION ATY(7)
      INTEGER AQVE
      INTEGER AOVE
  990 FORMAT()
  999 FORMAT(2X,7A10)
      READ(5,999)(ATY(I),I=1,7)
      WRITE(6,999)(ATY(I),I=1,7)
C SET UP ASP LAYOUT
C DISTANCES(KM) FROM HOLDING AND ASSEMBLY AREAS TO OPERATIONS OFFICE
C AND C.O. AND CHECKER SPEED STATISTICS(KM/HR)
      READ(5,999)(ATY(I),I=1,7)
      WRITE(6,999)(ATY(I),I=1,7)
      READ(5,1001)DOA,DOS
      WRITE(6,1001)DOA,DOS
      READ(5,1000)IOC,ICK
      WRITE(6,1000)IOC,ICK
      READ(5,1001)(PPARM(IOC,K),K=1,4)
      WRITE(6,1001)(PPARM(IOC,K),K=1,4)
      READ(5,1001)(PPARM(ICK,K),K=1,4)
      WRITE(6,1001)(PPARM(ICK,K),K=1,4)
C SAFETY INSPECTORS, LABORERS, AND CHECKERS ASSIGNED TO INPROCESSING
      READ(5,999)(ATY(I),I=1,7)
      WRITE(6,999)(ATY(I),I=1,7)
      READ(5,1000)NIO,NHO,NGO
 1000 FORMAT((2X,10(I3,2X)))
      WRITE(6,1000)NIO,NHO,NGO
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C AVERAGE SERVICE TIMES FOR VARIOUS STAGES OF INPROCESSING
      READ(5,999)(ATY(I),I=1,7)
      WRITE(6,999)(ATY(I),I=1,7)
      READ(5,1000)ITIV,ITIA,ITA,ITIB,ITIL,ITBO,ITRO
      WRITE(6,1000)ITIV,ITIA,ITA,ITIB,ITIL,ITBO,ITRO
      READ(5,1001)(PPARM(ITIV,K),K=1,4)
 1001 FORMAT((5X,6(F10.4,2X)))
      WRITE(6,1001)(PPARM(ITIV,K),K=1,4)
      READ(5,1001)(PPARM(ITIA,K),K=1,4)
      WRITE(6,1001)(PPARM(ITIA,K),K=1,4)
      READ(5,1001)(PPARM(ITA,K),K=1,4)
      WRITE(6,1001)(PPARM(ITA,K),K=1,4)
      READ(5,1001)(PPARM(ITIB,K),K=1,4)
      WRITE(6,1001)(PPARM(ITIB,K),K=1,4)
      READ(5,1001)(PPARM(ITIL,K),K=1,4)
      WRITE(6,1001)(PPARM(ITIL,K),K=1,4)
      READ(5,1001)(PPARM(ITBO,K),K=1,4)
      WRITE(6,1001)(PPARM(ITBO,K),K=1,4)
      READ(5,1001)(PPARM(ITRO,K),K=1,4)
      WRITE(6,1001)(PPARM(ITRO,K),K=1,4)
C STOCKAGE INFORMATION
      READ(5,999)(ATY(I),I=1,7)
      WRITE(6,999)(ATY(I),I=1,7)
      READ(5,1000)NSL
      WRITE(6,1000)NSL
      READ(5,1002)(ADODC(I),XLIR(I),XLBRD(I),XRDBX(I),XBXPL(I),
     QI=1,NSL)
 1002 FORMAT((2X,A10,2X,4(F10.4,2X)))
      WRITE(6,1002)(ADODC(I),XLIR(I),XLBRD(I),XRDBX(I),XBXPL(I),
     QI=1,NSL)
C FIELD STORAGE UNITS (FSU'S) IN A SECTION, STACKS PER EACH
C FSU, DODC NUMBER AND QUANTITY OF ITEMS STORED IN EACH STACK,
C AND MHE SERVICE ASSIGNMENT
      READ(5,999)(ATY(I),I=1,7)
      WRITE(6,999)(ATY(I),I=1,7)
      READ(5,1000)NFSU
      WRITE(6,1000)NFSU
      DO 10 I=1,NFSU
      READ(5,1000)NSTACK(I)
      WRITE(6,1000)I,NSTACK(I)
      NS=NSTACK(I)
      IF(NS.EQ.0)GOTO 10
      READ(5,1003)(ADODX(I,J),ALOTX(I,J),XSQTY(I,J),J=1,NS)
 1003 FORMAT((2X,2(A10,2X),F10.4))
      WRITE(6,1103)(ADODX(I,J),ALOTX(I,J),XSQTY(I,J),J=1,NS)
 1103 FORMAT((2X,2(A10,2X),F12.4))
   10 CONTINUE
C REORDER STATISTICS
      READ(5,999)(ATY(I),I=1,7)
      WRITE(6,999)(ATY(I),I=1,7)
      READ(5,1000)ITROX
      WRITE(6,1000)ITROX
      READ(5,1001)(PPARM(ITROX,K),K=1,4)
      WRITE(6,1001)(PPARM(ITROX,K),K=1,4)
C ASSIGNMENT OF MHE'S TO FIELD STORAGE UNITS
      READ(5,999)(ATY(I),I=1,7)
      WRITE(6,999)(ATY(I),I=1,7)
      DO 15 I=1,NFSU
      READ(5,1000)NMHF(I)
      WRITE(6,1000)I,NMHF(I)
      NM=NMHF(I)
      IF(NM.EQ.0)GOTO 15
      READ(5,1000)(IMHF(I,J),J=1,NM)
      WRITE(6,1000)(IMHF(I,J),J=1,NM)
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   19 CONTINUE
      DO 20 I=1,NSL
      AQ=ADODC(I)
      XLIO(I)=0
      DO 20 J=1,NFSU
      NS=NSTACK(J)
      DO 20 K=1,NS
      IF(ADODX(J,K).EQ.AQ)XLIO(I)=XLIO(I)+XSQTY(J,K)
   20 CONTINUE
      WRITE(6,1101)(ADODC(I),XLIO(I),I=1,NSL)
 1101 FORMAT((2X,4(A10,2X,F12.2,2X)))
C ROAD-DISTANCES BETWEEN FIELD STORAGE UNITS(KM)
      NSITE=NFSU+2
      DO 21 I=1,NSITE
      DO 21 J=1,NSITE
   21 DST(I,J)=0.
      READ(5,999)(ATY(I),I=1,7)
      WRITE(6,999)(ATY(I),I=1,7)
      READ(5,1000)NDZ
      READ(5,1104)(I,J,DST(I+1,J+1),KI=1,NDZ)
 1104 FORMAT((4(2X,2(I2,2X),F5.2)))
      DO 23 I=1,NSITE
   23 WRITE(6,1004)(DST(I,J),J=1,NSITE)
 1004 FORMAT((2X,22(F3.2,1X)))
      READ(5,1000)IASP
      WRITE(6,1000)IASP
      IASX=IASP
      READ(5,1001)(PPARM(IASX,K),K=1,4)
      WRITE(6,1001)(PPARM(IASX,K),K=1,4)
C MATERIAL HANDLING EQUIPMENT (MHE) ASSIGNMENT INFORMATION
      READ(5,999)(ATY(I),I=1,7)
      WRITE(6,999)(ATY(I),I=1,7)
      READ(5,1000)NMHEQ
      WRITE(6,1000)NMHEQ
      READ(5,1000)(NTYP(I),I=1,NMHEQ)
      WRITE(6,1000)(NTYP(I),I=1,NMHEQ)
C LOADING RATE FOR MHE'S BY TRUCK TYPE(2.5T,5T,8TG), MHE TYPE
C (FORKLIFT OR CRANE), AND LINE ITEM TYPE(PALLET)
      READ(5,1000)ITRKE,IMHEE,IDKE
      WRITE(6,1000)ITRKE,IMHEE,IDKE
      READ(5,1516)(ADKE(K),K=1,IDKE)
 1516 FORMAT(6(2X,A10))
      WRITE(6,1516)(ADKE(K),K=1,IDKE)
      READ(5,1000)IST
      WRITE(6,1000)IST
      ILR=IST
      DO 24 I=1,ITRKE
      DO 24 J=1,IMHEE
      DO 24 K=1,IDKE
      IRMHE(I,J,K)=ILR
      READ(5,1001)(PPARM(ILR,KL),KL=1,4)
      WRITE(6,1001)(PPARM(ILR,KL),KL=1,4)
      ILR=ILR+1
   24 CONTINUE
      WRITE(6,1000)(((IRMHE(I,J,K),I=1,ITRKE),J=1,IMHEE),K=1,IDKE)
C LOADING RATE FOR LABORER (NUMBER OF BOXES PER MAN HOUR)
      READ(5,999)(ATY(I),I=1,7)
      WRITE(6,999)(ATY(I),I=1,7)
      READ(5,1000)IRLOAD
      WRITE(6,1000)IRLOAD
      READ(5,1001)(PPARM(IRLOAD,K),K=1,4)
      WRITE(6,1001)(PPARM(IRLOAD,K),K=1,4)
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C QUEUE SERVICE STATION STATISTICS
      AQS(1)=4HINSP
      IQS(1)=0
      AQS(2)=4HMANC
      IQS(2)=0
      AQS(3)=4HMASC
      IQS(3)=0
      AQS(4)=4HLOCC
      IQS(4)=1
      AQS(5)=4HLOCC
      IQS(5)=2
      AQS(6)=4HCKAG
      IQS(6)=0
      NQS=6+NFSU+NMHEQ+1
      IK=6
      DO 40 IQQ=1,NFSU
      AQS(IK+IQQ)=4HFSU
      IQS(IK+IQQ)=IQQ
   40 CONTINUE
      IK=IK+NFSU
      DO 41 IQQ=1,NMHEQ
      AQS(IK+IQQ)=4HMHE
      IQS(IK+IQQ)=IQQ
   41 CONTINUE
      IK=IK+NMHEQ
      AQS(IK+1)=4HOUTC
      IQS(IK+1)=0
C HISTROGRAMS
      NNHIS=7
      LLABH(1,1)=4HTKS/
      LLABH(1,2)=4HCONV
      LLABH(2,1)=4HINSP
      LLABH(2,2)=4H/QUE
      LLABH(3,1)=4HHC/
      LLABH(3,2)=4HQUE
      LLABH(4,1)=4HMC/
      LLABH(4,2)=4HQUE
      LLABH(5,1)=4HLC/
      LLABH(5,2)=4HQUE
      LLABH(6,1)=4HCKA/
      LLABH(6,2)=4HQUE
      LLABH(7,1)=4HOC/
      LLABH(7,2)=4HQUE
      DO 408 IHIS=1,NNHIS
      NNCEL(IHIS)=20
      HHLOW(IHIS)=1.
      HHWID(IHIS)=1.
  408 CONTINUE
      NNCEL(1)=NNCEL(1)+2
      DO 418 IHIS=2,NNHIS
  418 NNCEL(IHIS)=NNCEL(IHIS)+NNCEL(IHIS-1)+2
C PLOTS
      NNPLT=1
      LLPLT=0
      NNVAR(1)=9
      DTPLT(1)=10.
      IITAP(1)=0
      NNVR=NNVAR(1)
      LLABP(2,1)=4HCON/
      LLABP(2,2)=4HASP
      LLABP(1,1)=4HTKS/
      LLABP(1,2)=4HASP
      LLABP(3,1)=4HTKS/
      LLABP(3,2)=4HHLD
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      LLABP(4,1)=4HTKS/
      LLABP(4,2)=4HLDA
      LLABP(5,1)=4HTKS/
      LLABP(5,2)=4HABY
      LLABP(6,1)=4HCC/
      LLABP(6,2)=4HOFI
      LLABP(7,1)=4HCC/
      LLABP(7,2)=4HOFO
      LLABP(8,1)=4HCK/
      LLABP(8,2)=4HHLD
      LLABP(9,1)=4HLB/
      LLABP(9,2)=4HHLD
      LLABP(11,1)=4H
      LLABP(11,2)=4HTIME
      LLSYM(1)=1HT
      LLSYM(2)=1HC
      LLSYM(3)=1HH
      LLSYM(4)=1HL
      LLSYM(5)=1HA
      LLSYM(6)=1HI
      LLSYM(7)=1HO
      LLSYM(8)=1HK
      LLSYM(9)=1HB
      NNSET=20000
      MMPTS=(NNSET-NNCFI)/(NNVAR(1)+1)
      DO 409 IPL=1,NNVR
      XNP(IPL)=0.
      LLPLO(IPL)=1
      LLPHI(IPL)=1
      PPLO(IPL)=0.
      PPHI(IPL)=100.
  409 CONTINUE
      XNP(8)=NGO
      XNP(9)=NHO
C INITIALIZE OBSERVED STATISTICS
      DO 411 INEC=1,100
      LAQ(INEC)=0
      LAS(INEC)=0
      NME(INEC)=0
  411 CONTINUE
      DO 412 INED=1,510
  412 ISDX(INED)=0
      DO 413 INET=1,50
      ISDT(INET)=0
  413 CONTINUE
      NOV=23
      NNCLT=23
C AVERAGE WAIT TIME FOR CONVOY IN ASP
      AOVE(1,1)='ASP-'
      AOVE(1,2)='W/CN'
C AVERAGE TIME BETWEEN CONVOY ARRIVALS TO ASP
      AOVE(2,1)='ASP-'
      AOVE(2,2)='A/CN'
C AVERAGE TIME BETWEEN CONVOY DEPARTURES FROM ASP
      AOVE(3,1)='ASP-'
      AOVE(3,2)='D/CN'
C AVERAGE WAIT TIME OF TRUCK IN HOLDING AREA
      AOVE(11,1)='HLD-'
      AOVE(11,2)='W/TK'
C AVERAGE TIME BETWEEN CHECKER DEPARTURES FROM HOLDING AREA
      AOVE(12,1)='HLD-'
      AOVE(12,2)='D/CK'
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C AVERAGE TIME BETWEEN CHECKER ARRIVALS AT ASSY AREA
      AOVE(19,1)='ABY-'
      AOVE(19,2)='A/CK'
C AVERAGE WAIT TIME OF TRUCK IN ASSY AREA
      AOVE(20,1)='ABY-'
      AOVE(20,2)='W/TK'
C AVERAGE WAIT TIME FOR TRUCK AT FSU
      AOVE(13,1)='LDA-'
      AOVE(13,2)='W/CK'
C AVEAGE TIME CHECKER IN FSU QUEUE FOR MHE SERVICE
      AOVE(14,1)='LDA-'
      AOVE(14,2)='Q/CK'
C AVE SERVICE TIME FOR CHECKER BY MHE AT FSU
      AOVE(15,1)='LDA-'
      AOVE(15,2)='S/MH'
C AVEAGE SEVICE TIME BY LABORERES
      AOVE(16,1)='LDA-'
      AOVE(16,2)='S/LB'
C AVE TRAVEL DISTANCE PER TRUCK TRIP IN ASP
      AOVE(17,1)='LDA-'
      AOVE(17,2)='TRVD'
C AVEAGE TRAVEL TIME FOR CHECKER WITHIN LDA
      AOVE(18,1)='LDA-'
      AOVE(18,2)='T/CK'
C AVE WAIT TIME IN ASP OFFICE (INPROCESSING QUEUE)
      AOVE(4,1)='OFI-'
      AOVE(4,2)='W/CC'
C AVEAGE TIME TR IN HEAD CLERK QUEUE
      AOVE(5,1)='OFI-'
      AOVE(5,2)='Q/HC'
C AVE SERVICE TIME IN ASP OFFICE (INPROCESSING) HEAD CLERK
      AOVE(6,1)='OFI-'
      AOVE(6,2)='S/HC'
C AVEAGE TIME TR IN MASTER CLERK QUEUE
      AOVE(7,1)='OFI-'
      AOVE(7,2)='Q/MC'
C AVE SEVICE TIME IN ASP OFFICE (INPROCESSING) MASTER CLERK
      AOVE(8,1)='OFI-'
      AOVE(8,2)='S/MC'
C AVERAGE TIME TR IN LOCATOR CLERK QUEUE
      AOVE(9,1)='OFI-'
      AOVE(9,2)='Q/LC'
C AVE SERVICE TIME IN ASP OFFICE (INPROCESSING) LOCATOR CLERK
      AOVE(10,1)='OFI-'
      AOVE(10,2)='S/LC'
C AVE WAIT TIME IN ASP OFFICE (OUTPROCESSING) QUEUE
      AOVE(21,1)='OFO-'
      AOVE(21,2)='W/CC'
C AVERAGE TIME WITHIN CLERK QUEUE
      AOVE(22,1)='OFO-'
      AOVE(22,2)='Q/OC'
C AVE SERVICE TIME IN ASP OFFICE OUTPROCESSING
      AOVE(23,1)='OFO-'
      AOVE(23,2)='S/CC'
C OBSERVED VARIABLE STATISTICS (COLCT)
      DO 43 IOV=1,NOV
      ANM(IOV)=0.
      ISM(IOV)=0
      SSOBV(IOV,1)=0.
      SSOBV(IOV,2)=0.
      SSOBV(IOV,3)=0.
      LLABC(IOV,1)=AOVE(IOV,1)
      LLABC(IOV,2)=AOVE(IOV,2)
   43 CONTINUE
```

```
C INITIALIZE TIME PERSISTENT STATISTICS
      NQV=16
      NNSTA=16
C AVE NUMBER CONVOYS IN ASP OVERTIME
      AQVE(1,1)='ASP-'
      AQVE(1,2)='N/CN'
C AVE NUMBER TRUCKS IN ASP
      AQVE(2,1)='ASP-'
      AQVE(2,2)='N/TK'
C AVE NUMBER OF TRUCKS IN HOLDING AREA
      AQVE(8,1)='HLD-'
      AQVE(8,2)='N/TK'
C AVE NUMBER OF INSPECTORS IN USE
      AQVE(7,1)='HLD-'
      AQVE(7,2)='N/SP'
C AVE NUMBER CHECKERS IN USE
      AQVE(9,1)='LDA-'
      AQVE(9,2)='N/CK'
C AVE NUMBER LABORERS IN USE
      AQVE(10,1)='LDA-'
      AQVE(10,2)='N/LB'
C AVE NUMBER CONVOY COMMANDERS (CC) IN OFFICE INPROCESSING
      AQVE(3,1)='OFI-'
      AQVE(3,2)='N/CC'
C AVEAGE NUMBER IN HEAD CLERK QUEUE
      AQVE(4,1)='OFI-'
      AQVE(4,2)='N/HC'
C AVEAGE NUMBER IN MASTER CLERK QUEUE
      AQVE(5,1)='OFI-'
      AQVE(5,2)='N/MC'
C AVEAGE NUMBER IN LOCATOR CLERK QUEUE
      AQVE(6,1)='OFI-'
      AQVE(6,2)='N/LC'
C AVE NUMBER TRUCKS IN LOADING AREA
      AQVE(11,1)='LDA-'
      AQVE(11,2)='N/TK'
C AVE NUMBER MHE'S IN USE
      AQVE(12,1)='LDA-'
      AQVE(12,2)='N/ME'
C AVE NUMBER FSU'S IN USE
      AQVE(13,1)='LDA-'
      AQVE(13,2)='N/FS'
C AVE NUMBER TRUCKS IN ASSY AREA
      AQVE(14,1)='ASY-'
      AQVE(14,2)='N/TK'
C AVE NUMBER CC IN OFFICE OUTPROCESSING
      AQVE(15,1)='OFO-'
      AQVE(15,2)='N/CC'
C AVEAGE NUMBER IN OUTPROCESSING CLERK QUEUE
      AQVE(16,1)='OFO-'
      AQVE(16,2)='N/OC'
C TIME PERSISTENT VARIABLE STATISTICS (TIMST)
      DO 42 IQV=1,NQV
      SSTPV(IQV,1)=0.
      SSTPV(IQV,2)=0.
      SSTPV(IQV,3)=0.
      SSTPV(IQV,6)=0.
      LLABT(IQV,1)=AQVE(IQV,1)
      LLABT(IQV,2)=AQVE(IQV,2)
   42 CONTINUE
C CUSTOMER IN SCENERIO
      READ(5,999)(ATY(I),I=1,7)
      WRITE(6,999)(ATY(I),I=1,7)
```

```
C CONVOY FORWARD AREA ROAD TRAVEL SPEED(KM/HR)
      READ(5,1000)NUNIT,IRSP,ILSP
      WRITE(6,1000)NUNIT,IRSP,ILSP
      READ(5,1001)(PPARM(IRSP,K),K=1,4)
      WRITE(6,1001)(PPARM(IRSP,K),K=1,4)
      READ(5,1001)(PPARM(ILSP,K),K=1,4)
      WRITE(6,1001)(PPARM(ILSP,K),K=1,4)
C USING UNITS ASSIGNED TO ASP FOR SUPPORT
C BASIC LOAD AND ROAD DISTANCES FROM ASP(KM)
      DO 27 I=1,NUNIT
C USING UNITS AND ROAD DISTANCES
      READ(5,1102)ATITLE(I),DGO(I),DRTN(I)
 1102 FORMAT((2X,A10,2X,2(F10.4,2X)))
      WRITE(6,1102)ATITLE(I),DGO(I),DRTN(I)
C OFFICE INPROCESSING TIME FOR USING UNIT
      READ(5,1000)IATMC(I),IATLC(I)
      WRITE(6,1000)IATMC(I),IATLC(I)
      READ(5,1001)(PPARM(IATMC(I),K),K=1,4)
      WRITE(6,1001)(PPARM(IATMC(I),K),K=1,4)
      READ(5,1001)(PPARM(IATLC(I),K),K=1,4)
      WRITE(6,1001)(PPARM(IATLC(I),K),K=1,4)
C OFFICE CHECKER ASSIGNMENT FOR USING UNIT
      READ(5,1512)NCK(I)
 1512 FORMAT (2X,10(I2,2X))
      WRITE (6,1512)NCK(I)
      NCH=NCK(I)
      DO 25 IJ=1,NCH
      READ(5,1512)NLBX(I,IJ),NTK(I,IJ),NSP(I,IJ)
      WRITE(6,1512)NLBX(I,IJ),NTK(I,IJ),NSP(I,IJ)
      NKK=NTK(I,IJ)
      READ(5,1512)(ITK(I,IJ,K),K=1,NKK)
      WRITE(6,1512)(ITK(I,IJ,K),K=1,NKK)
      NSPT=NSP(I,IJ)
      DO 25 IK=1,NSPT
      READ(5,1513)NFSX(I,IJ,IK),NPTX(I,IJ,IK),AQTX(I,IJ,IK),NBX(I,IJ,IK)
     Q,NLX(I,IJ,IK)
 1513 FORMAT(2X,I2,2X,I2,2X,A10,2(2X,I2))
      WRITE(6,1513)NFSX(I,IJ,IK),NPTX(I,IJ,IK),AQTX(I,IJ,IK),NBX(I,IJ,IK
     Q),NLX(I,IJ,IK)
   25 CONTINUE
C TRUCK STOCKAGE ASSIGNMENT IN BASIC LOAD
      READ(5,1121)NBT(I)
 1121 FORMAT(14X,I4)
      WRITE(6,1000)NBT(I)
      NTT=NBT(I)
      DO 27 J=1,NTT
      READ(5,1010)ATKB(I,J),NLB(I,J)
      WRITE(6,1010)ATKB(I,J),NLB(I,J)
      NLL=NLB(I,J)
      DO 27 K=1,NLL
      READ(5,1003)ADODB(I,J,K),ATYPB(I,J,K),XQTYB(I,J,K)
      WRITE(6,1003)ADODB(I,J,K),ATYPB(I,J,K),XQTYB(I,J,K)
   27 CONTINUE
C USING UNIT NOMENCLATURE AND DEPARTURE TIME
      READ(5,999)(ATY(I),I=1,7)
      WRITE(6,999)(ATY(I),I=1,7)
      READ(5,1000)NS
      WRITE(6,1000)NS
      DO 30 I=1,NS
C USING UNIT DEPARTURE TIME, NUMBER OF TRUCKS AND UNIT
      READ(5,1115)AT(I),AUNIT(I)
```

```
 1113 FORMAT(2X,F10.4,2X,A10)
      ATTX=AT(I)
      CALL PLAC(1,ATTX,1,I,0)
      CALL FDUNIT(AUNIT(I),II)
      NT(I)=NBT(II)
      WRITE(6,1005)AT(I),NT(I),AUNIT(I)
 1005 FORMAT(2X,F10.4,2X,I4,2X,A10)
      NTT=NT(I)
      DO 30 J=1,NTT
C TYPE OF TRUCK AND NUMBER OF CHIT SHEET ENTRIES
      ATK(I,J)=ATKB(II,J)
      NL(I,J)=NLB(II,J)
 1010 FORMAT(2X,A10,2X,I3)
      WRITE(6,1010)ATK(I,J),NL(I,J)
      NLL=NL(I,J)
C CHIT SHEET ENTRIES BY DODC, ISSUE TYPE(PALLET OR BOX), AND QUANTITY
      DO 30 K=1,NLL
      ADOD(I,J,K)=ADODB(II,J,K)
      ATYP(I,J,K)=ATYPB(II,J,K)
      XQTY(I,J,K)=XQTYB(II,J,K)
C CONVERT TO NUMBER OF ROUNDS IN ISSUE
      CALL CONV(FAC,ADOD(I,J,K),ATYP(I,J,K))
      WRITE(6,1113)ADOD(I,J,K),ATYP(I,J,K),XQTY(I,J,K),FAC
 1113 FORMAT((2X,2(A10,2X),2(F12.4,2X)))
      XQTY(I,J,K)=FAC*XQTY(I,J,K)
   30 CONTINUE
C INITIALIZATION OF ASP STATUS PARAMETERS
      ISDAY=0
      TDUSK=720.
      TDAWN=1440.
      NS=0
      NIQ=0
      NIS=0
      NCH=0
      NQH=0
      NCM=0
      NQM=0
      NCL(1)=0
      NCL(2)=0
      NQL(1)=0
      NQL(2)=0
      NCA=0
      NQH=0
      NQT=0
      NQO=0
      NQO=0
      NHL=NHO
      DO 110 I=1,100
      NIC(I)=0
      NIT(I)=0
      NSH(I)=0
      NSM(I)=0
      DO 109 JX=1,2
      NSLL(JX,I)=0
  109 CONTINUE
      NCT(I)=0
      NCI(I)=0
      NCC(I)=0
      NTC(I)=0
      NCTT(I,1)=0
      NCTT(I,2)=0
      NCTT(I,3)=0
```

```
      NCTT(I,4)=0
      NCTT(I,8)=0
      NLTT(I)=0
      NQTQ(I)=0
      NQC(I)=0
      DO 110 J=1,60
      NPC(J,I)=0
      NPS(J,I)=0
  110 CONTINUE
      DO 120 I=1,200
      NLIF(I)=0
      NNS(I)=0
      NSQ(I)=0
      TSS(I)=0.
      TES(I)=0.
      TSD(I)=TTBEG
      TED(I)=0.
      TSW(I)=0.
      TEW(I)=0.
  120 CONTINUE
      DO 130 I=1,20
      NQVE(I)=0
      NGC(I)=0
      NGCT(I)=0
      NGT(I)=0
      NGL(I)=0
      NGS(I)=0
  130 CONTINUE
      DO 140 I=1,5
      NISC(I)=0
      NIST(I)=0
  140 CONTINUE
      DO 150 I=1,30
      IMHE(I)=0
  150 CONTINUE
      DO 155 I=1,60
      NQP(I)=0
  155 CONTINUE
      DO 160 I=1,50
      DO 160 J=1,15
      ISP(I,J)=0
      ISS(I,J)=0
      NLIP(I,J)=0
      DO 160 K=1,20
      IFSU(I,J,K)=0
      ISTC(I,J,K)=0
      XLQTY(I,J,K)=0.
  160 CONTINUE
      RETURN
      END
      SUBROUTINE FOUNIT(AQ,I)
      COMMON/UNITS/NUNIT,ATITLE(20),DGO(20),DRTN(20),IRSP,ILSP
      LEVEL 2,AQ
      DO 10 I=1,NUNIT
      IF(AQ.EQ.ATITLE(I))RETURN
   10 CONTINUE
      I=NUNIT
      RETURN
      END
      SUBROUTINE CONV(FAC,AD,AT)
C
C
```

```
C NUMBER OF ROUNDS IN ISSUE
      COMMON/STOCKS/NSL,ADODC(200),XLIC(200),XLIR(200),NLIF(200)
     Q,XLBRD(200),XRDBX(200),XBXPL(200)
      LEVEL 2, AD, AT
      DIMENSION ATYP(2)
      DATA ATYP/10HBOX        ,10HPALLET    /
      FAC=1.
      DO 10 I=1,NSL
      IF(AD.EQ.ADODC(I))GOTO 20
   10 CONTINUE
      RETURN
   20 CONTINUE
      IF(AT.EQ.ATYP(1))FAC=XRDBX(I)
      IF(AT.EQ.ATYP(2))FAC=XBXPL(I)
      RETURN
      END
      SUBROUTINE PLAC(I,AT,N1,N2,N3)
C
C
C PLACES EVENT IN GASP REFERENCE FILE
      COMMON/GCOM1/ATRIB(25),JEVNT,MFA,MFE(100),MLE(100),MSTOP,
     QNCRDR,NNAPC,NNAPT,NNATR,NNFIL,NNQ(100),NNTRY,NPRNT,
     QPPARM(200,4),TNOW,TTBEG,TTCLR,TTFIN,TTRIB(25),TTSET
      LEVEL 2, ATRIB
      ATRIB(1)=AT
      ATRIB(2)=N1
      ATRIB(3)=N2
      ATRIB(4)=N3
      CALL FILEM(I)
      RETURN
      END
      SUBROUTINE EVNTS(IE)
C
C
C SUBROUTINE PROCESSES CALLS FROM TIME-EVENT FILE ACCORDING TO
C EVENT CLASS CODING
      COMMON/GCOM1/ATRIB(25),JEVNT,MFA,MFE(100),MLE(100),MSTOP,
     QNCRDR,NNAPC,NNAPT,NNATR,NNFIL,NNQ(100),NNTRY,NPRNT,
     QPPARM(200,4),TNOW,TTBEG,TTCLR,TTFIN,TTRIB(25),TTSET
      COMMON/CPNS/TDUSK,TDAWN,ISDAY
      LEVEL 2, ATRIB
      T=TNOW
      I=ATRIB(3)
      J=ATRIB(4)
      WRITE(6,1000)T,IE,I,J
 1000 FORMAT(2X,"EVENT",7X,F10.4,2X,3(I4,2X))
      IF(T.GT.TDUSK.AND.ISDAY.LE.0)CALL CONVP
      IF(T.GT.TDAWN.AND.ISDAY.GT.0)CALL CONVP
      GOTO(100,101,102,103,104,105,106,107,108,109,110,111,
     Q112,113,114,115),IE
C CUSTOMER LEAVES UNIT
  100 CALL LVUNIT(I,T)
      RETURN
C CUSTOMER ARRIVES AT HOLDING AREA
  101 CALL QHOLD(I,T)
      RETURN
C SAFETY INSPECTOR COMPLETES VEHICLE INSPECTION
  102 CALL INSP(I,T)
      RETURN
C CONVOY COMMANDER ARRIVES AT OPERATIONS OFFICE
  103 CALL ISRQ(I,T)
      RETURN
```

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C CHIEF CLERK COMPLETES TO SERVICE
  104 CALL CCTOS(I,T)
      RETURN
C MASTER FILE CLERK COMPLETES TO SERVICE
  105 CALL MCTOS(I,T)
      RETURN
C LOCATOR FILE CLERK COMPLETES STOCK SLIP SERVICE
  106 CALL LCTOS(I,J,T)
      RETURN
C CHECKER RELEASED FROM HOLDING AREA WITH TRUCKS AND STORE SLIPS
  107 CALL TASSP(I,T)
      RETURN
C CHECKER COMPLETES ROAD TRIP TO AMMO PAD WITH TRUCKS
  108 CALL TCRPD(I,J,T)
      RETURN
C CHECKER COMPLETES LOADING SERVICE AT AMMO PAD
  109 CALL TCLPD(I,J,T)
      RETURN
C CHECKER ARRIVES AT CONVOY BUILD UP AREA
  110 CALL TACBA(I,T)
      RETURN
C CHECKER ARRIVES AT OPERATIONS OFFICE
  111 CALL CKSRO(I,T)
      RETURN
C CONVOY COMMANDER ARRIVES AT SRC OPERATIONS OFFICE
  112 CALL COSRO(I,T)
      RETURN
C CUSTOMER COMPLETES SRC OUT-PROCESSING
  113 CALL COCMP(I,T)
      RETURN
C USER'S CONVOY ARRIVES BACK AT UNIT AREA
  114 CALL MISC(I,T)
      RETURN
C RESUPPLY OF LINE ITEM STOCKAGE
  115 CALL SUPPL(I,J)
      RETURN
      END
      SUBROUTINE CONVP
      COMMON/GCOM1/ATRIB(25),JEVNT,MFA,MFE(100),MLE(100),MSTOP,
     QNCRDR,NNAPC,NNAPT,NNATR,NNFIL,NNQ(100),NNTRY,NPRNT,
     QPPARM(200,4),TNOW,TTBEG,TTCLR,TTFIN,TTRIB(25),TTSET
      COMMON/UNITS/NUNIT,ATITLE(20),DGO(20),DRTN(20),IRSP,ILSP
      COMMON/SITES/DST(60,60),IASP,NFSU,NSTACK(60),ADODX(60,20),
     QALOTX(60,20),XSQTY(60,20)
      COMMON/OPNS/TDUSK,TDAWN,ISD
      LEVEL 2, ATRIB
      LEVEL 2, DST
C RATIO OF DAYLIGHT TO NIGHTTIME ROADWAY SPEEDS FORWARD OF LIGHT LINE
      DATA RW,AR/2.,1.875/
      IASX=IASP
      WRITE(6,1000)ISD,TDAWN,TDUSK
 1000 FORMAT(2X,'ROADWAY SPEED CHANGE',2X,I2,2X,'TDAWN',2X,F10.4,
     Q'TDUSK',2X,F10.4)
      IF(ISD.LE.0)GOTO 10
C PASSING FROM DAWN INTO DAYLIGHT
      ISD=0
      TDAWN=TDAWN+1440.
C      DAYTIME ROADWAY SPEEDS
      DO 5 K=1,4
      PPARM(IRSP,K)=PPARM(IRSP,K)*RW
      PPARM(IASX,K)=PPARM(IASX,K)*AR
    5 CONTINUE
      WRITE(6,1001)ISD,TDAWN,(PPARM(IRSP,K),K=1,4),(PPARM(IASX,K),K=1,4)
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 1001 FORMAT(2X,'DAYTIME SPEED',2X,I2,2X,'NEXT TDAWN',2X,F10.4/2X,
     G'ROAD SPEED',4(2X,F10.4)/2X,'ASP SPEED',4(2X,F10.4))
      RETURN
   10 CONTINUE
C PASSING FROM DUSK INTO NIGHT
      ISD=1
      TDUSK=TDUSK+1440.
C       NIGHTTIME ROADWAY SPEEDS
      DO 15 K=1,4
      PPARM(IRSP,K)=PPARM(IRSP,K)/RW
      PPARM(IASX,K)=PPARM(IASX,K)/AR
   15 CONTINUE
      WRITE(6,1002)ISD,TDUSK,(PPARM(IRSP,K),K=1,4),(PPARM(IASX,K),K=1,4)
 1002 FORMAT(2X,'NIGHTTIME SPEED',2X,I2,2X,'NEXT TDUSK',2X,F10.4/2X,
     G'ROAD SPEED',4(2X,F10.4)/2X,'ASP SPEED',4(2X,F10.4))
      RETURN
      END
      SUBROUTINE LVUNIT(II,T)
C
C
      COMMON/UNITS/NUNIT,ATITLE(20),DGO(20),DRTN(20),IRSP,ILSP
      COMMON/DEMAND/NS,AT(50),AUNIT(50),NT(50),ATK(50,15),NL(50,15),
     QADOD(50,15,20)
      LEVEL 2, NS
      DO 10 I=1,NUNIT
      IF(ATITLE(I).EQ.AUNIT(II))GOTO 20
   10 CONTINUE
      WRITE(6,1000)II
 1000 FORMAT(2X,"ERROR IN USER LEAVING UNIT",2X,I3)
      RETURN
   20 CONTINUE
      DIST=DGO(I)
      T1=T+RNORM(ILSP,1)
      TS=T1+(DIST/RNORM(IRSP,1))*60.
      CALL PLAC(1,TS,2,II,0)
      WRITE(6,3000)II,ATITLE(I),T1,DIST,TS
 3000 FORMAT(2X,'CONVOY',2X,I2,2X,'DEPARTS UNIT',2X,A10,2X,'AT',2X,F10.4
     Q,2X,'TRAVEL',2X,F10.4,2X,'ARRIVE ASP',2X,F10.4)
      RETURN
      END
      SUBROUTINE QHOLD(I,T)
C
C
C CONVOY ARRIVES AT ASP, PASS CO TO SPO AND INITIATE SAFETY
C INSPECTION
      COMMON/HOLDA/NIQ,NIC(100),NIT(100)
      COMMON/INSP/NIQ,NIS,NISC(5),NIST(5)
      COMMON/DEMAND/NS,AT(50),AUNIT(50),NT(50),ATK(50,15),NL(50,15),
     QADOD(50,15,20)
      COMMON/ATIME/ITIV,ITIA,ITA,ITIE,ITIL,ITBO,ITRQ
      COMMON/HQAR/DOA,DOQ,ICO,ICK
      LEVEL 2, NS
C INCREASE NUMBER OF CONVOYS AT ASP
      NS=NS+1
      CALL GPLOTX(1.,T,2)
      WRITE(6,3000)I,NS,T
 3000 FORMAT(2X,'CONVOY',2X,I2,2X,'AT ASP',2X,I2,2X,F10.4)
      CALL TIMS('ASP-','N/CN',1,T)
      AT(I)=T
      CALL EAVT('ASP-','A/CN',T)
C TIME FOR CONVOY COMMANDER TO REACH OPERATIONS OFFICE
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C NORMAL DISTRIBUTION
      TS=T+(DOA/RNORM(ICO,1))*60.
      CALL PLAC(1,TS,4,I,0)
      WRITE(6,3001)I,TS
 3001 FORMAT(2X,'CONVOY COMMANDER',2X,I2,2X,'AT OPNS',2X,F10.4)
C CHECK FOR SAFETY INSPECTION QUEUE
      NTT=NT(I)
      CALL TIMS('HLD=','N/TK',NTT,T)
      CALL TIMS('ASP=','N/TK',NTT,T)
      XNTT=NTT
      CALL HISTO(XNTT,1)
      CALL GPLOTX(XNTT,T,1)
      CALL GPLOTX(XNTT,T,3)
      IF(NIQ.EQ.0)GOTO 10
C QUEUE EXISTS AND JOIN TRUCKS TO QUEUE
      NLI=1
      GO TO 20
C QUEUE NOT EXISTS AND ASSIGN INSPECTOR TO TRUCK
   10 CONTINUE
      IF(NIS.EQ.0)CALL QSTAT(4HINSP,0,5,0,T)
      DO 15 J=1,NTT
      IF(NIS.GE.NIO)GOTO 18
      DO 12 KI=1,NIO
      IF(NISC(KI).EQ.0)GOTO 13
   12 CONTINUE
      GO TO 18
   13 CONTINUE
      CALL QSTAT(4HINSP,0,1,0,T)
      CALL QSTAT(4HINSP,0,2,0,T)
      CALL TIMS('HLD=','N/SP',1,T)
      CALL HISTO(0.,2)
      NIS=NIS+1
      NISC(KI)=I
      NIST(KI)=J
      TS=T+RNORM(ITIV,1)
      CALL PLAC(1,TS,3,KI,0)
      WRITE(6,3002)KI,I,J,TS
 3002 FORMAT(2X,'INSPECTOR',2X,I2,2X,'CONVOY',2X,I2,2X,'TRUCK',2X,I2,2X,
     Q'DONE',2X,F10.4)
   15 CONTINUE
      RETURN
   18 CONTINUE
      NLI=J
C PLACE REMAINING TRUCKS OF CONVOY IN SAFETY INSPECTION QUEUE
   20 CONTINUE
      DO 25 IJ=NLI,NTT
      CALL QSTAT(4HINSP,0,1,NIQ,T)
      XNIQ=NIQ
      CALL HISTO(XNIQ,2)
      NIQ=NIQ+1
      NIC(NIQ)=I
      NIT(NIQ)=IJ
      WRITE(6,3003)I,IJ,NIQ
 3003 FORMAT(2X,'INSPECTION QUEUE',2X,'CONVOY',2X,I2,2X,'TRUCK'2X,I2,2X,
     Q'PLACE',2X,I2)
   25 CONTINUE
      RETURN
      END
      SUBROUTINE GPLOTX(XNTT,T,I)
      COMMON/PLOT/XN(10)
      XN(I)=XN(I)+XNTT
      CALL GPLOT(XN,T,1)
```

```
      RETURN
      END
      SUBROUTINE EAVT(AQ,AS,T)
      COMMON/EAVE/NOV,ANM(25),ISM(25),AOVE(25,2)
      INTEGER AQ,AS,AOVE
      DO 10 IO=1,NOV
      IF(AOVE(IO,1).EQ.AQ.AND.AOVE(IO,2).EQ.AS)GOTO 20
   10 CONTINUE
      WRITE(6,3000)AQ,AS,T
 3000 FORMAT(2X,'EAVT CALL ERROR',2X,2A4,2X,F10.4)
      RETURN
   20 CONTINUE
      IF(ISM(IO).EQ.0)GOTO 21
      CALL COLC(AQ,AS,T-ANM(IO),T)
   21 ANM(IO)=T
      ISM(IO)=1
      RETURN
      END
      SUBROUTINE INSP(II,T)
C
C
C SAFETY INSPECTION COMPLETES INSPECTION OF VEHICLE
      COMMON/HOLDA/NIQ,NIC(100),NIT(100)
      COMMON/INSP/NIO,NIS,NISC(5),NIST(5)
      COMMON/STATUS/ISP(50,15),ISS(50,15)
      COMMON/ATIME/ITIV,ITIA,ITA,ITIB,ITIL,ITBO,ITRO
      WRITE(6,3010)II,T
 3010 FORMAT(2X,'INSPECTOR',2X,I2,2X,'DONE',2X,F10.4)
C FIND CONVOY-TRUCK JUST INSPECTED
      CALL QSTAT(4HINSP,0,3,0,T)
      I=NISC(II)
      J=NIST(II)
      WRITE(6,3000)II,I,J,T
 3000 FORMAT(2X,'INSPECTOR',2X,I2,2X,'DONE',2X,'CONVOY',2X,I2,2X,'TRUCK'
     Q,2X,I2,2X,F10.4)
C MOVE UP INSPECTION QUEUE
      IF(NIQ.EQ.0)GOTO 20
      CALL QSTAT(4HINSP,0,2,0,T)
      NISC(II)=NIC(1)
      NIST(II)=NIT(1)
      TS=T+RNORM(ITIV,1)
      CALL PLAC(1,TS,3,II,0)
      WRITE(6,3000)II,NIC(1),NIT(1),TS
      NIQ=NIQ-1
      IF(NIQ.EQ.0)GOTO 15
      DO 10 IQ=1,NIQ
      NIC(IQ)=NIC(IQ+1)
      NIT(IQ)=NIT(IQ+1)
      WRITE(6,3001)NIC(IQ),NIT(IQ),IQ
 3001 FORMAT(2X,'INSPECTION QUEUE',2X,'CONVOY',2X,I2,2X,'TRUCK',2X,I2,2X
     Q,'PLACE',2X,I2)
   10 CONTINUE
   15 NIC(NIQ+1)=0
      NIT(NIQ+1)=0
      GO TO 30
   20 CONTINUE
C NO MORE VEHICLES TO BE INSPECTED
      CALL TIMS('HLD-','N/SP',-1,T)
      NISC(II)=0
      NIST(II)=0
      NIS=NIS-1
      IF(NIS.LE.0)CALL QSTAT(4HINSP,0,4,0,T)
      WRITE(6,3002)II
```

```
 3002 FORMAT(2X,'INSPECTOR',2X,I2,2X,'FREE')
   30 CONTINUE
      ISP(I,J)=1
      IF(ISS(I,J).EQ.0)RETURN
C VEHICE READY TO BE RELEASED FROM HOLDING AREA
      CALL CASSP(I,J,T)
      RETURN
      END
      SUBROUTINE ISRO(I,T)
C
C
C CONVOY COMMANDER ARRIVES AT OPERATIONS OFFICE FOR INPROCESSING
      COMMON/CLERKS/NCH,NQH,NSH(100),NCM,NQM,NSM(100),NCL(2),NQL(2),NSL
     Q(2,100)
      COMMON/ATIME/ITIV,ITIA,ITA,ITIE,ITIL,ITBO,ITRO
      CALL TIMS('OFI-','N/CC',1,T)
      CALL WCOLC('OFI-','W/CC',I+35,T,1)
      CALL GPLOTX(1.,T,6)
      WRITE(6,3010)I,T
 3010 FORMAT(2X,'CONVOY COMMANDER',2X,I2,2X,'AT OPNS',2X,'TIME',2X,F10.4
     Q)
C CHECK HEAD CLERK TO SEE IF BUSY
      IF(NCH.GT.0.OR.NQH.GT.0)GOTO 20
      CALL QSTAT(4HMANC,0,1,0,T)
      CALL QSTAT(4HMANC,0,2,0,T)
      CALL QSTAT(4HMANC,0,3,0,T)
      CALL HISTO(0.,3)
      NQH=I
      TS=RNORM(ITIA,1)
      CALL COLC('OFI-','S/HC',TS,T)
      TS=T+TS
      CALL PLAC(1,TS,5,I,0)
      WRITE(6,3000)I,TS
 3000 FORMAT(2X,'HEAD CLERK',2X,'CONVOY',2X,I2,2X,'DONE',2X,F10.4)
      RETURN
C JOIN CUSTOMER TO HEAD CLERK QUEUE
   20 CONTINUE
      CALL QSTAT(4HMANC,0,1,NCH,T)
      XNCH=NCH
      CALL HISTO(XNCH,3)
      CALL TIMS('OFI-','N/HC',1,T)
      CALL QCOL('OFI-','Q/HC',I,T,1)
      NCH=NCH+1
      NSH(NCH)=I
      WRITE(6,3001)I,NCH
 3001 FORMAT(2X,'HEAD CLERK QUEUE',2X,'CONVOY',2X,I2,2X,'PLACE',2X,I2)
      RETURN
      END
      SUBROUTINE CCTOS(I,T)
C
C
C HEAD CLERK COMPLETES REVIEW OF TRANSPORTATION ORDER REQUEST
      COMMON/CLERKS/NCH,NQH,NSH(100),NCM,NQM,NSM(100),NCL(2),NQL(2),NSL
     Q(2,100)
      COMMON/DEMAND/NS,AT(50),AUNIT(50),NT(50),ATK(50,15),NL(50,15),
     QADOD(50,15,20)
      COMMON/ATIME/ITIV,ITIA,ITA,ITIE,ITIL,ITBO,ITRO
      LEVEL 2, NS
      WRITE(6,3010)I,T
 3010 FORMAT(2X,' HEAD CLERK COMPLETES',2X,'CONVOY',2X,I2,2X,'TIME',2X,F
     Q10.4)
      CALL QSTAT(4HMANC,0,3,0,T)
```

```
C CHECK FOR QUEUE AT MASTER FILE CLERK POSITION
      IF(NCM.GT.0.OR.NQM.NE.0)GOTO 20
      CALL QSTAT(4HMASC,0,1,0,T)
      CALL QSTAT(4HMASC,0,2,0,T)
      CALL QSTAT(4HMASC,0,3,0,T)
C MASTER FILE CLERK NOT BUSY
      NQM=I
      CALL GTMC(AUNIT(I),ATT)
      CALL COLC('OFI-','S/MC',ATT,T)
      CALL HISTO(0.,4)
      TS=T+ATT
      CALL PLAC(1,TS,6,I,0)
      CALL GQTY(I,XN)
      WRITE(6,3000)I,XN,TS
 3000 FORMAT(2X,'MASTER CLERK',2X,'CONVOY',2X,I2,2X,'LINES',2X,F10.4,2X,
     Q'DONE',2X,F10.4)
      GO TO 30
   20 CONTINUE
C MASTER FILE CLERK BUSY, ADD TO  REQUEST TO QUEUE
      CALL QSTAT(4HMASC,0,1,NCM,T)
      XNCM=NCM
      CALL HISTO(XNCM,4)
      CALL TIMS('OFI-','N/MC',1,T)
      CALL QCOL('OFI-','Q/MC',I,T,1)
      NCM=NCM+1
      NSM(NCM)=I
      WRITE(6,3001)I,NCM,NQM
 3001 FORMAT(2X,'MASTER FILE QUEUE',2X,'CONVOY',2X,I2,2X,'PLACE',2X,I2,2
     QX,'CLERK ASSIGNED',2X,I2)
   30 CONTINUE
C CHECK HEAD CLERK QUEUE FOR TO REQUEST SERVICE
      IF(NCH.NE.0)GOTO 40
C SET HEAD CLERK FLAG TO NOT BUSY
      CALL QSTAT(4HMANC,0,4,0,T)
      NQH=0
      WRITE(6,3002)
 3002 FORMAT(2X,'HEAD CLERK NOT BUSY')
      RETURN
   40 CONTINUE
C ACCEPT NEXT TO REQUEST, MOVE HEAD CLERK QUEUE UP ONE POSITION
      CALL QSTAT(4HMANC,0,2,0,T)
      II=NSH(1)
      CALL TIMS('OFI-','N/HC',-1,T)
      CALL QCOL('OFI-','Q/HC',II,T,-1)
      NQH=II
      TS=RNORM(ITIA,1)
      CALL COLC('OFI-','S/HC',TS,T)
      TS=T+TS
      CALL PLAC(1,TS,5,II,0)
      WRITE(6,3003)II,TS
 3003 FORMAT(2X,'HEAD CLERK',2X,'CONVOY',2X,I2,2X,'DONE',2X,F10.4)
      NCH=NCH-1
      IF(NCH.EQ.0)GOTO 46
      DO 45 II=1,NCH
      NSH(II)=NSH(II+1)
      WRITE(6,3004)II,NSH(II)
 3004 FORMAT(2X,'HEAD CLERK QUEUE',2X,'PLACE',2X,2X,I2,2X,'CONVOY',2X,I2
     Q)
   45 CONTINUE
   46 NSH(NCH+1)=0
      RETURN
```

```
      END
      SUBROUTINE GTMC(AQ,AT)
      COMMON/OPCT/IATMC(20),IATLC(20)
      LEVEL 2, AQ
      CALL FDUNIT(AQ,II)
      IAT=IATMC(II)
      AT=RNORM(IAT,1)
      RETURN
      END
      SUBROUTINE GQTY(I,XN)
C
C
      COMMON/DEMAND/NS,AT(50),AUNIT(50),NT(50),ATK(50,15),NL(50,15),
     QADOD(50,15,20)
      COMMON/LOAD/ATYP(50,15,20),XQTY(50,15,20)
      LEVEL 2, NS
      LEVEL 2, ATYP
      DIMENSION AQ(100)
      AQ(1)=ADOD(I,1,1)
      NN=1
      NTT=NT(I)
      DO 10 J=1,NTT
      NLL=NL(I,J)
      DO 10 K=1,NLL
      DO 5 KI=1,NN
      IF(AQ(KI).EQ.ADOD(I,J,K))GOTO 10
    5 CONTINUE
      NN=NN+1
      AQ(NN)=ADOD(I,J,K)
   10 CONTINUE
      XN=NN
      RETURN
      END
      SUBROUTINE MCTOS(I,T)
C
C
C MASTER FILE CLERK COMPLETES T.O. REQUEST SERVICE
      COMMON/CLERKS/NCH,NQH,NSH(100),NCM,NQM,NSM(100),NCL(2),NQL(2),NSL
     Q(2,100)
      COMMON/DEMAND/NS,AT(50),AUNIT(50),NT(50),ATK(50,15),NL(50,15),
     QADOD(50,15,20)
      COMMON/LOAD/ATYP(50,15,20),XQTY(50,15,20)
      COMMON/STOCKS/NSQ,ADODC(200),XLIQ(200),XLIR(200),NLIF(200)
     Q,XLBRD(200),XRDBX(200),XBXPL(200)
      LEVEL 2, NS
      LEVEL 2, ATYP
      WRITE(6,3010)I,T
 3010 FORMAT(2X,'MASTER FILE CLERK COMPLETES',2X,'CONVOY',2X,I2,2X,'TIME
     Q',2X,F10.4)
      CALL QSTAT(4HMASC,0,3,0,T)
C ADJUST MASTER FILE RECORDS FOR QUANTITIES ON COMPLETED REQUEST
      NTT=NT(I)
      DO 10 IT=1,NTT
      NLL=NL(I,IT)
      DO 10 IL=1,NLL
      DO 10 IS=1,NSQ
      IF(ADOD(I,IT,IL).NE.ADODC(IS))GOTO 10
      IF(XQTY(I,IT,IL).GT.XLIQ(IS))XQTY(I,IT,IL)=XLIC(IS)
      XLIQ(IS)=XLIQ(IS)-XQTY(I,IT,IL)
      IF(XLIQ(IS).LE.XLIR(IS).AND.NLIF(IS).EQ.0)CALL RECORD(IS,T)
      WRITE(6,3000)IT,IL,ADODC(IS),XQTY(I,IT,IL),XLIC(IS)
 3000 FORMAT(2X,'TRUCK',2X,I2,2X,'LINE',2X,I2,2X,'STORE',2X,A10,2X,'FILE
     Q',2X,F10.4,2X,'LEFT',2X,F12.4)
   10 CONTINUE
```

```
C CHECK FOR QUEUE AT LOCATOR FILE CLERK POSITION
      ICK=0
      DO 12 K=1,2
      IF(NQL(K).EQ.0.AND.NCL(K).EQ.0)ICK=K
   12 CONTINUE
      IF(ICK.EQ.0)GOTO 20
C LOCATOR FILE CLERK NOT BUSY
      CALL QSTAT(4HLOCC,ICK,5,0,T)
      CALL QSTAT(4HLOCC,ICK,1,0,T)
      CALL QSTAT(4HLOCC,ICK,2,0,T)
      CALL HISTO(0.,5)
      NQL(ICK)=I
      CALL GTLC(AUNIT(I),ATT)
      CALL COLC('OFI-','S/LC',ATT,T)
      TS=T+ATT
      CALL PLAC(1,TS,7,I,ICK)
      WRITE(6,3001)ICK,I,TS
 3001 FORMAT(2X,'LOCATOR CLERK',2X,I2,2X,'COMPLETES',2X,'CONVOY',2X,I2,2
     QX,'TIME',2X,F10.4)
      GO TO 30
C LOCATOR FILE CLERK BUSY, ADD T.O. TO QUEUE
   20 CONTINUE
      ICK=1
      IF(NCL(2).LT.NCL(1))ICK=2
      CALL QSTAT(4HLOCC,ICK,1,NCL(ICK),T)
      XNCL=NCL(ICK)
      CALL HISTO(XNCL,5)
      CALL TIMS('OFI-','N/LC',1,T)
      CALL QCOL('OFI-','Q/LC',I,T,1)
      NCL(ICK)=NCL(ICK)+1
      NSL(ICK,NCL(ICK))=I
      WRITE(6,3002)ICK,I,NCL(ICK),NQL(ICK)
 3002 FORMAT(2X,'LOCATOR QUEUE',2X,I2,2X,'CONVOY',2X,I2,2X,'PLACE',2X,I2
     Q,2X,'CLERK ON CONVOY',2X,I2)
   30 CONTINUE
C CHECK MASTER FILE CLERK QUEUE FOR T.O. SERVICE
      IF(NCM.NE.0)GOTO 40
C SET MASTER FILE CLERK FLAG TO NOT BUSY
      CALL QSTAT(4HMASC,0,4,0,T)
      NQM=0
      WRITE(6,3003)
 3003 FORMAT(2X,'MASTER FILE CLERK NOT BUSY')
      RETURN
   40 CONTINUE
C ACCEPT NEXT T.O. REQUEST AND MOVE MASTER FILE CLERK QUEUE UP ONE
C POSITION
      CALL QSTAT(4HMASC,0,2,0,T)
      CALL TIMS('OFI-','N/MC',-1,T)
      II=NSM(1)
      CALL QCOL('OFI-','Q/MC',II,T,-1)
      NQM=II
      CALL GTMC(AUNIT(I),ATT)
      CALL COLC('OFI-','S/MC',ATT,T)
      TS=T+ATT
      CALL PLAC(1,TS,6,II,0)
      WRITE(6,3004)II,TS
 3004 FORMAT(2X,'MASTER CLERK COMPLETES',2X,'CONVOY',2X,I2,2X,'TIME',2X,
     QF10.4)
      NCM=NCM-1
      IF(NCM.EQ.0)RETURN
      DO 45 II=1,NCM
      NSM(II)=NSM(II+1)
      WRITE(6,3005)NSM(II),II
```

```
 3005 FORMAT(2X,'MASTER QUEUE',2X,'CONVOY',2X,I2,2X,'PLACE',2X,I2)
   45 CONTINUE
      NSM(NCM+1)=0
      RETURN
      END
      SUBROUTINE GTLC(AQ,AT)
      COMMON/DFCT/IATMC(20),IATLC(20)
      LEVEL 2, AQ
      CALL FDUNIT(AQ,II)
      IAT=IATLC(II)
      AT=RNORM(IAT,1)
      RETURN
      END
      SUBROUTINE CASSP(I,J,T)
C
C
C SUBROUTINE RELEASES TRUCKS WITH CHECKER IF INSPECTION COMPLETE
C LABORERS AVAILABLE AND CHECKER AVAILABLE
      COMMON/STATUS/ISP(50,15),ISS(50,15)
      COMMON/CKASG/NCA,NCT(100),NCI(100),NCC(100),NTC(100),NCTT(100,5),N
     QLTT(100)
      COMMON/LABOR/NHO,NHL,IRLOAD
      COMMON/CHECKER/NGO,NGU,NGC(20),NGCT(20),NGT(20),NGL(20),NGS(20)
      COMMON/ATIME/ITIV,ITIA,ITA,ITIE,ITIL,ITBO,ITRO
      NHD=NHO-NHL
      WRITE(6,3010)I,J,NGU,NHD,T
 3010 FORMAT(2X,'CHECK RELEASE',2X,'CONVOY',2X,I2,2X,'TRUCK',2X,I2,2X,'C
     QHECKERS IN USE',2X,I2,2X,'LABORERS IN USE',2X,I2,2X,'TIME',2X
     Q,F10.4)
      IF(NGU.GE.NGO)RETURN
C CHECKER AVAILABLE
      DO 10 IC=1,NCA
      IF(NCT(IC).NE.I)GOTO 10
      NTT=NTC(IC)
      DO 5 IT=1,NTT
    5 IF(NCTT(IC,IT).EQ.J)GOTO 20
   10 CONTINUE
      RETURN
   20 CONTINUE
      WRITE(6,3001)IC,IT
 3001 FORMAT(2X,'ASG QUEUE',2X,I2,2X,'TRUCK',2X,I2)
C DESIGNATED CHECKER TRUCK COMBINATION FOUND
      DO 21 IT=1,NTT
      ITT=NCTT(IC,IT)
   21 IF(ISP(I,ITT).EQ.0.OR.ISS(I,ITT).EQ.0)RETURN
C ALL TRUCKS WITH CHECKER COMPLETE INSPECTION
      NL=NLTT(IC)
      WRITE(6,3002)NL,NHL
 3002 FORMAT(2X,'LABORERS',2X,'ASG',2X,I2,2X,'ON-HAND',2X,I2)
      IF(NL.GT.NHL)RETURN
C LABORERS AVAILABLE
C RELEASE CHECKER WITH TRUCKS AND LABORER
      DO 22 NG=1,NGO
      IF(NGC(NG).EQ.0)GOTO 23
   22 CONTINUE
      RETURN
   23 CONTINUE
      NGU=NGU+1
      NGC(NG)=I
      NGT(NG)=NCC(IC)
      NGCT(NG)=NCI(IC)
      DO 25 IT=1,NTT
      IIT=NCTT(IC,IT)
      ISP(I,IIT)=2
```

```
   25 CONTINUE
      NHL=NHL-NLTT(IC)
      WRITE(6,3003)NG,I,NTT,NCTT(IC,1),NCTT(IC,2),NCTT(IC,3),NLTT(IC)
 3003 FORMAT(2X,'CHECKER',2X,I2,2X,'CONVOY',2X,I2,2X,'NUMBER TRUCKS',2X,
     QI2/2X,'FIRST TRUCK',2X,I2,2X,'SECOND TRUCK',2X,I2,2X,'THIRD TRUCK'
     Q,2X,I2,2X,'LABORERS',2X,I2)
      CALL QSTAT(4HCKAG,0,2,0,T)
      CALL QSTAT(4HCKAG,0,3,0,T)
C CLOSE UP CHECKER QUEUE
      NCA=NCA-1
      IF(NCA.EQ.0)CALL QSTAT(4HCKAG,0,4,0,T)
      IF(NCA.EQ.0)GOTO 30
      DO 27 II=IC,NCA
      NCT(II)=NCT(II+1)
      NCI(II)=NCI(II+1)
      NCC(II)=NCC(II+1)
      NTC(II)=NTC(II+1)
      NLTT(II)=NLTT(II+1)
      NCTT(II,1)=NCTT(II+1,1)
      NCTT(II,2)=NCTT(II+1,2)
      NCTT(II,3)=NCTT(II+1,3)
      NCTT(II,4)=NCTT(II+1,4)
      NCTT(II,5)=NCTT(II+1,5)
   27 CONTINUE
   30 CONTINUE
      NCT(NCA+1)=0
      NTC(NCA+1)=0
      NCI(NCA+1)=0
      NCC(NCA+1)=0
      NLTT(NCA+1)=0
      NCTT(NCA+1,1)=0
      NCTT(NCA+1,2)=0
      NCTT(NCA+1,3)=0
      NCTT(NCA+1,4)=0
      NCTT(NCA+1,5)=0
C ASSIGN DEPARTURE TIME
      TS=T+RNORM(ITA,1)
      CALL PLAC(1,TS,8,NG,0)
      WRITE(6,3004)NG,TS
 3004 FORMAT(2X,'CHECKER',2X,I2,2X,'DEPARTS',2X,F10.4)
      RETURN
      END
      SUBROUTINE LCTOS(I,J,T)
C
C
      COMMON/STATUS/ISP(50,15),ISS(50,15)
      COMMON/DEMAND/NS,AT(50),AUNIT(50),NT(50),ATK(50,15),NL(50,15),
     QADOD(50,15,20)
      COMMON/CLERKS/NCH,NQH,NSH(100),NCM,NQM,NSM(100),NCL(2),NQL(2),NSL
     Q(2,100)
      LEVEL 2, NS
      CALL TIMS('QFI-','N/CC',-1,T)
      CALL WCOLC('QFI-','W/CC',I+35,T,-1)
      CALL GPLOTX(-1.,T,6)
      WRITE(6,3010)J,I,T
 3010 FORMAT(2X,'LOCATOR CLERK',2X,I2,2X,'COMPLETES',2X,'CONVOY',2X,I2
     Q,2X,'TIME',2X,F10.4)
      CALL QSTAT(4HLOCC,J,3,0,T)
      IF(NCL(J).GT.0)GOTO 10
C NO MORE T.O. IN LOCATOR FILE QUEUE
      CALL QSTAT(4HLOCC,J,4,0,T)
      NQL(J)=0
      GO TO 20
   10 CONTINUE
```

```
C PROCESS NEXT T.O. IN LOCATOR FILE QUEUE
      CALL QSTAT(4HLOCC,J,2,0,T)
      CALL TIMS('QFI-','N/LC',-1,T)
      II=NSL(J,1)
      NQL(J)=II
      CALL QCOL('QFI-','Q/LC',II,T,-1)
      CALL GTLC(AUNIT(I),ATT)
      CALL COLC('QFI-','S/LC',ATT,T)
      TS=T+ATT
      CALL PLAC(1,TS,7,II,J)
      NCL(J)=NCL(J)-1
      WRITE(6,3000)J,II,TS
 3000 FORMAT(2X,'LOCATOR CLERK',2X,I2,2X,'STARTS',2X,'CONVOY',2X,I2,2X,
     Q'COMPLETE',2X,F10.4)
      IF(NCL(J).EQ.0)GOTO 18
      NCLL=NCL(J)
      DO 17 II=1,NCLL
      NSL(J,II)=NSL(J,II+1)
      WRITE(6,3001)NSL(J,II),II
 3001 FORMAT(2X,'LOCATOR QUEUE',2X,'CONVOY',2X,I2,2X,'PLACE',2X,I2)
   17 CONTINUE
   18 NCLL=NCL(J)
      NSL(J,NCLL+1)=0
   20 CONTINUE
      CALL CKFUNC(I,T)
      NTT=NT(I)
      DO 21 IT=1,NTT
      ISS(I,IT)=1
      IF(ISP(I,IT).EQ.1)CALL CASSP(I,IT,T)
   21 CONTINUE
      RETURN
      END
      SUBROUTINE CKFUNC(I,T)
C
C
      COMMON/DEMAND/NS,AT(50),AUNIT(50),NT(50),ATK(50,15),NL(50,15),
     QADOD(50,15,20)
      COMMON/LOAD/ATYP(50,15,20),XQTY(50,15,20)
      COMMON/SITES/DST(60,60),IASP,NFSU,NSTACK(60),ADODX(60,20),
     QALOTX(60,20),XSQTY(60,20)
      COMMON/CKASG/NCA,NCT(100),NCI(100),NCC(100),NTC(100),NCTT(100,5),N
     QLTT(100)
      COMMON/QFCK/NCK(20),NLB(20,10),NTK(20,10),ITK(20,10,5),NSP(20,10),
     QNFSX(20,10,10),NPT(20,10,10),AQT(20,10,10),NBX(20,10,10),NLX(20,10
     Q,10)
      LEVEL 2, NS
      LEVEL 2, DST
      LEVEL 2, NCK
      NTT=NT(I)
      WRITE(6,3010)I,NTT
 3010 FORMAT(2X,'ASSIGN PICKUP',2X,'CONVOY',2X,I2,2X,'NUMBER TRUCKS',2X,
     QI2)
      IF(NCA.EQ.0)CALL QSTAT(4HCKAG,0,5,0,T)
      CALL FOUNIT(AUNIT(I),II)
      NCU=NCK(II)
      DO 40 IC=1,NCU
      NSTOP=NSP(II,IC)
      CALL QSTAT(4HCKAG,0,1,NCA,T)
      XNCA=NCA
      CALL HISTO(XNCA,6)
      NCA=NCA+1
      NCT(NCA)=I
      NCI(NCA)=II
```

```
      NCC(NCA)=IC
      NLTT(NCA)=NLB(II,IC)
      NTC(NCA)=NTK(II,IC)
      NTT=NTC(NCA)
      DO 30 IT=1,NTT
      NCTT(NCA,IT)=ITK(II,IC,IT)
      ITT=ITK(II,IC,IT)
   30 CONTINUE
      WRITE(6,3000)NCA,NCT(NCA),NTC(NCA),NCTT(NCA,1),NCTT(NCA,2),NCTT(NC
     QA,3),NLTT(NCA)
 3000 FORMAT(2X,'ASS-CHECKER QUEUE',2X,'PLACE',2X,I2,2X,'CONVOY',2X,I2,2
     QX,'TRUCKS',2X,I2/2X,'FIRST TRUCK',2X,I2,2X,'SECOND',2X,I2,2X,'THIR
     QD',2X,I2,2X,'LABORER',2X,I2)
   40 CONTINUE
      RETURN
      END
      SUBROUTINE SSLIP(I,J,IK,JQ,KK,ISS)
C
C
C SUBROUTINE ESTABLISHES STORE SLIP FOR TRUCK
      COMMON/LOAD/ATYP(50,15,20),XQTY(50,15,20)
      COMMON/STORES/NLIP(50,15),IFSU(50,15,20),ISTC(50,15,20)
      COMMON/STOREL/XLQTY(50,15,20)
      COMMON/SITES/DST(60,60),IASP,NFSU,NSTACK(60),ADODX(60,20),
     QALOTX(60,20),XSQTY(60,20)
      COMMON/LABOR/NHQ,NHL,IRLOAD
      LEVEL 2, ATYP
      LEVEL 2, NLIP
      LEVEL 2, XLQTY
      LEVEL 2, DST
      IFSU(I,J,ISS)=JQ
      ISTC(I,J,ISS)=KK
      IF(XSQTY(JQ,KK).GE.XQTY(I,J,IK))GOTO 10
      XLQTY(I,J,ISS)=XSQTY(JQ,KK)
      XQTY(I,J,IK)=XQTY(I,J,IK)-XSQTY(JQ,KK)
      XSQTY(JQ,KK)=0.
      GOTO 20
   10 CONTINUE
      XSQTY(JQ,KK)=XSQTY(JQ,KK)-XQTY(I,J,IK)
      XLQTY(I,J,ISS)=XQTY(I,J,IK)
      XQTY(I,J,IK)=0.
   20 CONTINUE
      WRITE(6,3001)I,J,ISS,IFSU(I,J,ISS),ISTC(I,J,ISS),XLQTY(I,J,ISS)
 3001 FORMAT(2X,'STORE-SLIP',2X,'CONVOY',2X,I2,2X,'TRUCK',2X,I2,2X,'STOP
     Q',2X,I2,2X,'FSU',2X,I2,2X,'STACK',2X,I2,2X,'QTY',2X,F10.4)
      RETURN
      END
      SUBROUTINE TASSP(IC,T)
C
C
C CHECKER RELEASED FROM HOLDING AREA WITH TRUCKS AND STORE SLIPS
      COMMON/DEMAND/NS,AT(50),AUNIT(50),NT(50),ATK(50,15),NL(50,15),
     QADOD(50,15,20)
      COMMON/CHECKER/NGO,NG,NGC(20),NGCT(20),NGT(20),NGL(20),NGS(20)
      COMMON/STORES/NLIP(50,15),IFSU(50,15,20),ISTC(50,15,20)
      COMMON/STOREL/XLQTY(50,15,20)
      COMMON/SITES/DST(60,60),IASP,NFSU,NSTACK(60),ADODX(60,20),
     QALOTX(60,20),XSQTY(60,20)
      COMMON/DFCK/NCK(20),NLB(20,10),NTK(20,10),ITK(20,10,9),NSP(20,10),
     QNFSX(20,10,10),NPT(20,10,10),AQT(20,10,10),NBX(20,10,10),NLX(20,10
     Q,10)
      LEVEL 2, NS
      LEVEL 2, NLIP
      LEVEL 2, XLQTY
```

```
      LEVEL 2, DST
      LEVEL 2, NCK
C FIND FIRST PSU STOP FOR CHECKER- TRUCKS
      II=NGCT(IC)
      ICC=NGT(IC)
      NTKX=NTK(II,ICC)
      NLBX=NLB(II,ICC)
      CALL GPLOTX(-1.,T,8)
      XNLBX=NLBX
      CALL GPLOTX(-XNLBX,T,9)
      CALL TIMS('HLD-','N/TK',-NTKX,T)
      CALL TIMS('LDA-','N/TK',NTKX,T)
      CALL TIMS('LDA-','N/CK',1,T)
      CALL TIMS('LDA-','N/LB',NLBX,T)
      CALL WCOLC('LDA-','W/CK',IC+70,T,1)
      I=NGC(IC)
      XNTKX=NTKX
      CALL GPLOTX(-XNTKX,T,3)
      CALL GPLOTX(XNTKX,T,4)
      DO 3 ITT=1,NTKX
      CALL COLC('HLD-','W/TK',T-AT(I),T)
    3 CONTINUE
      CALL EAVT('HLD-','D/CK',T)
      IF=NFSX(II,ICC,1)
      DXT=DST(1,IF+1)
      DO 4 ITC=1,NTKX
      JC=ITK(II,ICC,ITC)
      CALL DCOL('LDA-','TRVD',I,JC,DXT,T,1)
    4 CONTINUE
C FIND TIME AND ASSIGN ARRIVAL
      IASX=IASP
      TS=(DXT/RNORM(IASX,1))*60.
      CALL TCOL('LDA-','T/CK',IC,TS,T,1)
      TS=TS+T
      CALL PLAC(1,TS,9,IC,1)
      NGL(IC)=0
      NGS(IC)=0
      J=ITK(II,ICC,1)
      WRITE(6,3001)IC,I,J,IF,DXT,TS,NLBX
 3001 FORMAT(2X,'CHECKER',2X,I2,2X,'RELEASED FR HOLDING AREA',2X,'CONVOY
     Q',2X,I2,2X,'FIRST TRUCK',2X,I2,2X,'FIRST STOP',2X,I2,2X,'DISTANCE'
     Q,2X,F10.4,2X,'TIME',2X,F10.4,'LABORERS',2X,I2)
      RETURN
      END
      SUBROUTINE TCRPD(IC,ISS,T)
C
C
C CHECKER COMPLETES ROAD TRIP TO AMMO PAD WITH TRUCK
      COMMON/DEMAND/NS,AT(50),AUNIT(50),NT(50),ATK(50,15),NL(50,15),
     QADOD(50,15,20)
      COMMON/LOAD/ATYP(50,15,20),XQTY(50,15,20)
      COMMON/STORES/NLIP(50,15),IFSU(50,15,20),ISTC(50,15,20)
      COMMON/STOREL/XLQTY(50,15,20)
      COMMON/SITES/DST(60,60),IASP,NFSU,NSTACK(60),ADODX(60,20),
     QALOTX(60,20),XSQTY(60,20)
      COMMON/CHECKER/NGO,NG,NGC(20),NGCT(20),NGT(20),NGL(20),NGS(20)
      COMMON/NMHE/NMHEO,IMHE(30),NMHF(60),IMHF(60,5),
     QNTYP(30),IRMHE(5,5,20),IDKE,ADKE(200)
      COMMON/PADS/NOP(60),NPC(60,100),NPS(60,100)
      COMMON/LABOR/NHO,NHL,IRLOAD
      COMMON/OFCK/NCK(20),NLB(20,10),NTK(20,10),ITK(20,10,5),NSP(20,10),
     QNFSX(20,10,10),NPT(20,10,10),AQT(20,10,10),NBX(20,10,10),NLX(20,10
     Q,10)
```

```
      COMMON/ATIME/ITIV,ITIA,ITA,ITIE,ITIL,ITBG,ITRG
      LEVEL 2, NS
      LEVEL 2, ATYP
      LEVEL 2, NLIP
      LEVEL 2, XLGTY
      LEVEL 2, DST
      LEVEL 2, NGP
      LEVEL 2, NCK
      CALL TIMS('LDA-','N/FS',1,T)
      I=NGC(IC)
      II=NGCT(IC)
      ICC=NGT(IC)
      IF=NFSX(II,ICC,ISS)
      J=ITK(II,ICC,1)
      IS=ISTC(I,J,ISS)
      WRITE(6,3001)IC,ISS,I,J,IF,IS,T
 3001 FORMAT(2X,'CHECKER',2X,I2,2X,'ARRIVES',2X,'STOP',2X,I2,2X,'CONVOY'
     Q,2X,I2,2X,'TRUCK',2X,I2,2X,'FSU',2X,I2,2X,'STACK',2X,I2,2X,'TIME',
     Q2X,F10.4)
      IF(NPT(II,ICC,ISS).EQ.0)GOTO 30
      IF(NPT(II,ICC,ISS).GT.0.AND.NGL(IC).GT.0)GOTO 30
C FIND MHE FOR AMMO PAD
C FIND IF QUEUE EXISTS AT PAD OR MHE IS BUSY
      IF(NQP(IF).NE.0)GOTO 20
      NE=NMHF(IF)
      IE=0
      IFLAG=0
      DO 5 IK=1,NE
      IJ=IMHF(IF,IK)
      IF(IMHE(IJ).EQ.IF)IFLAG=IFLAG+1
      IF(IFLAG.GE.2)GOTO 20
      IF(IMHE(IJ).EQ.0)IE=IJ
    5 CONTINUE
      IF(IE.EQ.0)GOTO 20
C LOAD TRUCKS BY MHE
      CALL QSTAT(4HFSU ,IF,3,0,T)
      CALL QSTAT(4HFSU ,IF,1,0,T)
      CALL QSTAT(4HFSU ,IF,2,0,T)
      CALL QSTAT(4HMHE ,IE,3,0,T)
      CALL QSTAT(4HMHE ,IE,1,0,T)
      CALL QSTAT(4HMHE ,IE,2,0,T)
      CALL TIMS('LDA-','N/ME',1,T)
      IMHE(IE)=IF
      ITE=NTYP(IE)
      NTT=NTK(II,ICC)
      CALL ATRK(ATK(I,J),IT)
      AQ=AQT(II,ICC,ISS)
      CALL ALOD(AQ,IL)
      IRX=IRMHE(IT,ITE,IL)
      XP=NPT(II,ICC,ISS)
      TS=RNORM(ITIE,1)+XP*RNORM(IRX,I)
      CALL COLC('LDA-','S/MH',TS,T)
      TS=T+TS
      CALL PLAC(1,TS,10,IC,ISS)
      NGL(IC)=IE
      WRITE(6,3002)IE,IC,IF,IS,NTT,TS
 3002 FORMAT(2X,'MHE',2X,I2,2X,'LOAD',2X,'CHECKER',2X,I2,2X,'FSU',2X,I2,
     Q2X,'STACK',2X,I2,2X,'TRUCKS',2X,I2,2X,'COMPLETED',2X,F10.4)
      RETURN
   20 CONTINUE
      IF(NBX(II,ICC,ISS).NE.0.AND.NGS(IC).EQ.0)GOTO 30
```

```
C ASSIGN TRUCKS TO AMMO PAD QUEUE
      NXXY=NQP(IP)
      CALL QSTAT(4HPSU ,IP,1,NXXY,T)
      CALL QCOL('LDA-','Q/CK',IC+35,T,1)
      NQP(IP)=NQP(IP)+1
      IP=NQP(IP)
      NPC(IP,IP)=IC
      NPS(IP,IP)=ISS
      WRITE(6,3003)IP,NPC(IP,IP),IP,NTK(II,ICC),NPS(IP,IP)
 3003 FORMAT(2X,'LOADING QUEUE',2X,'PSU',2X,I2,2X,'CHECKER',2X,I2,2X,'PL
     QACE',2X,I2,2X,'TRUCKS',2X,I2,2X,'STOP',2X,I2)
      RETURN
   30 CONTINUE
C LOADERS MANUALLY LOAD TRUCKS
      XN=NLX(II,ICC,ISS)
      XB=NBX(II,ICC,ISS)
      RX=RNORM(IRLOAD,1)/60.
      TS=RNORM(ITIL,1)+XB/(XN*RX)
      CALL COLC('LDA-','S/LB',TS,T)
      TS=TS+T
      CALL PLAC(1,TS,10,IC,ISS)
      WRITE(6,3004)XN,IC,IP,IS,NTK(II,ICC),TS
 3004 FORMAT(2X,'LOADERS',2X,F10.4,2X,'LOADING',2X,'CHECKER',2X,I2,2X,'P
     QSU',2X,I2,2X,'STACK',2X,I2,2X,'TRUCKS',2X,I2,2X,'COMPLETED',2X,F10
     Q.4)
      NGS(IC)=XN
      RETURN
      END
      SUBROUTINE ATRK(AQ,I)
C
C
      LEVEL 2,AQ
      DIMENSION ATYP(3)
      DATA ATYP/10H2.5T      ,10H5T        ,10H8TG       /
      DATA NTRK/3/
      DO 10 I=1,NTRK
      IF(AQ.EQ.ATYP(I))RETURN
   10 CONTINUE
      I=NTRK
      RETURN
      END
      SUBROUTINE ALOD(AQ,IL)
C
      COMMON/NMHE/NMHEQ,IMHE(30),NMHF(60),IMHF(60,5),
     QNTYP(30),IRMHE(5,5,20),IDKE,ADKE(200)
      IDKEQ=IDKE-1
      DO 10 IL=1,IDKEQ
      IF(AQ.EQ.ADKE(IL))RETURN
   10 CONTINUE
      IL=IDKE
      RETURN
      END
      SUBROUTINE TCLPD(IC,ISS,T)
C
C
C CHECKER COMPLETES LOADING SERVICE AT AMMO PAD
      COMMON/DEMAND/NS,AT(50),AUNIT(50),NT(50),ATK(50,15),NL(50,15),
     QADOD(50,15,20)
      COMMON/LOAD/ATYP(50,15,20),XQTY(50,15,20)
      COMMON/STORES/NLIP(50,15),IFSU(50,15,20),ISTC(50,15,20)
      COMMON/STOREL/XLQTY(50,15,20)
      COMMON/SITES/DST(60,60),IASP,NFSU,NSTACK(60),ADODX(60,20),
     QALOTX(60,20),XSQTY(60,20)
      COMMON/CHECKER/NGO,NG,NGC(20),NGCT(20),NGT(20),NGL(20),NGS(20)
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      COMMON/NMME/NMMEQ,IMME(30),NMMF(60),IMMF(60,5),
     QNTYP(30),IRMME(5,5,20),IDKE,ADKE(200)
      COMMON/PADS/NGP(60),NPC(60,100),NPS(60,100)
      COMMON/OFCK/NCK(20),NLB(20,10),NTK(20,10),ITK(20,10,5),NSP(20,10),
     QNFSX(20,10,10),NPT(20,10,10),AQT(20,10,10),NBX(20,10,10),NLX(20,10
     Q,10)
      LEVEL 2, NS
      LEVEL 2, ATYP
      LEVEL 2, NLIP
      LEVEL 2, XLQTY
      LEVEL 2, DST
      LEVEL 2, NGP
      LEVEL 2, NCK
      CALL TIMS('LDA-','N/FS',-1,T)
      I=NGC(IC)
      II=NGCT(IC)
      ICC=NGT(IC)
      IF1=NFSX(II,ICC,ISS)
      J=ITK(II,ICC,1)
      WRITE(6,3001)IC,I,J,NGL(IC),NGS(IC),IF1,ISS
 3001 FORMAT(2X,'LOADING COMPLETE',2X,'CHECKER',2X,I2,2X,'CONVOY',2X,I2,
     Q2X,'FIRST TRUCK',2X,I2,2X,'MME',2X,I3,2X,'LABOR',2X,I3,2X,'FSU',2X
     Q,I2,2X,'STOP',2X,I2)
      IF(NPT(II,ICC,ISS).GT.0.AND.NGL(IC).EQ.0)GOTO 40
      IF(NPT(II,ICC,ISS).GT.0.AND.NGL(IC).LT.200)GOTO 20
      IF(NBX(II,ICC,ISS).GT.0.AND.NGS(IC).EQ.0)GOTO 40
   20 CONTINUE
      IF(NSP(II,ICC).LE.ISS)GOTO 10
C NEXT STOP IS AN AMMO PAD
      IF2=NFSX(II,ICC,ISS+1)
      DX=DST(IF1+1,IF2+1)
      NTKX=NTK(II,ICC)
      DO 3 ITC=1,NTKX
      JC=ITK(II,ICC,ITC)
      CALL DCOL('LDA-','TRVD',I,JC,DX,T,1)
    3 CONTINUE
      IASX=IASP
      TS=(DX/RNORM(IASX,1))*60.
      CALL TCOL('LDA-','T/CK',IC,TS,T,1)
      TS=TS+T
      CALL PLAC(1,TS,9,IC,ISS+1)
      NGL(IC)=0
      NGS(IC)=0
      WRITE(6,3002)IC,I,J,ISS,IF1,IF2,DX,TS
 3002 FORMAT(2X,'CHECKER'2X,I2,2X,'CONVOY',2X,I2,2X,'FIRST TRUCK',2X,I2,
     Q2X,'STOP',2X,I2,2X,'DEPART FSU',2X,I2,2X,'NEXT FSU',2X,I2,2X,'DIST
     QANCE',2X,F10.4,2X,'ARRIVE',2X,F10.4)
      RETURN
   10 CONTINUE
C NEXT STOP IS VEHICLE ASSEMBLY AREA
      DX=DST(IF1+1,NFSU+2)
      NTKX=NTK(II,ICC)
      DO 4 ITC=1,NTKX
      JC=ITK(II,ICC,ITC)
      CALL DCOL('LDA-','TRVD',I,JC,DX,T,-1)
    4 CONTINUE
      IASX=IASP
      TS=(DX/RNORM(IASX,1))*60.
      CALL TCOL('LDA-','T/CK',IC,TS,T,-1)
      TS=TS+T
      CALL PLAC(1,TS,11,IC,0)
      WRITE(6,3003)IC,I,J,ISS,IF1,DX,TS
```

```
 3003 FORMAT(2X,'CHECKER',2X,I2,2X,'CONVOY',2X,I2,2X,'FIRST TRUCK',2X,I2
     @,2X,'STOP',2X,I2,2X,'DEPART POE',2X,I2,2X,'FOR VEH ASSY AREA',2X,'
     @DISTANCE',2X,F10.4,2X,'ARRIVE',2X,F10.4)
      RETURN
   20 CONTINUE
C LOADING DONE BY MHE
      CALL QSTAT(4HFSU ,IF1,3,0,T)
      IE=NGL(IC)
      IF=IMHE(IE)
      CALL QSTAT(4HMHE ,IE,3,0,T)
      NGL(IC)=201
      IF(NQP(IF).NE.0)GOTO 30
C MHE QUEUE EMPTY AND SET MHE FLAG TO NON BUSY
      CALL QSTAT(4HFSU ,IF,4,0,T)
      DO 26 IJ=1,NFSU
      IF(IF.EQ.IJ)GOTO 26
      NE=NMHF(IJ)
      DO 25 IIE=1,NE
      IEE=IMHF(IJ,IIE)
      IF(IEE.EQ.IE)GOTO 27
   25 CONTINUE
      GO TO 26
   27 CONTINUE
      IF(NQP(IJ).EQ.0)GOTO 26
      IFLAG=0
      DO 28 IIE=1,NE
      IEE=IMHF(IJ,IIE)
      IF(IMHE(IEE).EQ.IJ)IFLAG=IFLAG+1
   28 CONTINUE
      IF(IFLAG.GE.2)GOTO 26
      IF=IJ
      GOTO 30
   26 CONTINUE
      IMHE(IE)=0
      CALL QSTAT(4HMHE ,IE,4,0,T)
      CALL TIMS('LDA-','N/ME',-1,T)
      WRITE(6,3004)IE,IF
 3004 FORMAT(2X,"MHE",2X,I2,2X,"FREE AT FSU",2X,I2)
      GO TO 39
C MHE QUEUE FOR SERVICE, IGNORE MHE TRAVEL TIME BETWEEN ASSIGNED
C FSU'S
   30 CONTINUE
      CALL QSTAT(4HMHE ,IE,1,0,T)
      CALL QSTAT(4HMHE ,IE,2,0,T)
      IMHE(IE)=IF
      CALL QSTAT(4HFSU ,IF,2,0,T)
      ICX=NPC(IF,1)
      CALL QCOL('LDA-','Q/CK',ICX+35,T,-1)
      ISSX=NPS(IF,1)
      ITE=NTYP(IE)
      IX=NGC(ICX)
      IIX=NGCT(ICX)
      ICCX=NGT(ICX)
      JX=ITK(IIX,ICCX,1)
      CALL ATRK(ATK(IX,JX),ITX)
      XP=NPT(IIX,ICCX,ISSX)
      AQ=AQT(IIX,ICCX,ISSX)
      CALL ALOD(AQ,IL)
      IRX=IRMHE(ITX,ITE,IL)
      TS=RNORM(ITIE,1)+XP*RNORM(IRX,1)
      CALL COLC('LDA-','S/MH',TS,T)
      TS=T+TS
      CALL PLAC(1,TS,10,ICX,ISSX)
      NGL(ICX)=IE
```

```
      NQP(IF)=NQP(IF)-1
      NC=NQP(IF)
      IF(NC.EQ.0)GO TO 37
      DO 35 IJ=1,NC
      NPC(IF,IJ)=NPC(IF,IJ+1)
      NPS(IF,IJ)=NPS(IF,IJ+1)
   35 CONTINUE
   37 CONTINUE
      NPC(IF,NC+1)=0
      NPS(IF,NC+1)=0
      WRITE(6,3005)IE,ICX,IF,ISSX,NTK(IIX,ICCX),TS
 3005 FORMAT(2X,'MHE',2X,I2,2X,'LOADING',2X,'CHECKER',2X,I2,2X,'QUEUE AT
     Q FSU',2X,I2,2X,'STOP',2X,I2,2X,'TRUCKS',2X,I2,2X,'COMPLETED',2X,F1
     QQ.4)
   39 CONTINUE
      IF(NBX(II,ICC,ISS).GT.0.AND.NBS(IC).EQ.0)GOTO 40
      GO TO 50
   40 CONTINUE
      CALL TCRPD(IC,ISS,T)
      RETURN
      END
      SUBROUTINE DCOL(AQ,AS,I,J,DXT,T,IS)
      COMMON/DCOLC/ISD(510),DST(510)
      INTEGER AQ,AS
      IM=((I-1)*15+J)
      IF(IS.LT.0)GOTO 20
      IF(ISD(IM).GT.0)GOTO 10
      ISD(IM)=1
      DST(IM)=DXT
      RETURN
   10 CONTINUE
      ISD(IM)=1
      DST(IM)=DST(IM)+DXT
      RETURN
   20 CONTINUE
      CALL COLC(AQ,AS,DST(IM)+DXT,T)
      ISD(IM)=0
      RETURN
      END
      SUBROUTINE TCOL(AQ,AS,IC,TS,T,IS)
      COMMON/TCOLC/ISD(90),TSS(90)
      INTEGER AQ,AS
      IF(IS.LT.0)GOTO 20
      IF(ISD(IC).GT.0)GOTO 10
      ISD(IC)=1
      TSS(IC)=TS
      RETURN
   10 CONTINUE
      ISD(IC)=1
      TSS(IC)=TSS(IC)+TS
      RETURN
   20 CONTINUE
      CALL COLC(AQ,A3,TSS(IC)+TS,T)
      ISD(IC)=0
      RETURN
      END
      SUBROUTINE QCOL(AQ,AS,I,T,IS)
      COMMON/QCOLC/TSX(100)
      INTEGER AQ, AS
      IF(IS.LT.0)GOTO 20
      TSX(I)=T
      RETURN
```

```
   20 CONTINUE
      CALL COLC(AQ,AS,T-TSX(I),T)
      RETURN
      END
      SUBROUTINE TACBA(IC,T)
C
C
C CHECKER ARRIVES AT VEHICLE ASSEMBLY AREA
      COMMON/HQAR/DAQ,DSQ,ICQ,ICK
      COMMON/CONVOY/NQTQ(100),NQT
      COMMON/DEMAND/NS,AT(50),AUNIT(50),NT(50),ATK(50,15),NL(50,15),
     QADOD(50,15,20)
      COMMON/LOAD/ATYP(50,15,20),XQTY(50,15,20)
      COMMON/CHECKER/NGQ,NG,NGC(20),NGCT(20),NGT(20),NGL(20),NGS(20)
      COMMON/OPCK/NCK(20),NLB(20,10),NTK(20,10),ITK(20,10,5),NSP(20,10),
     QNPSX(20,10,10),NPT(20,10,10),AQT(20,10,10),NBX(20,10,10),NLX(20,10
     Q,10)
      LEVEL 2, NS
      LEVEL 2, ATYP
      LEVEL 2, NCK
C ADD RETURNED TRUCK TO USER'S CONVOY
      I=NGC(IC)
      II=NGCT(IC)
      ICC=NGT(IC)
      NTKX=NTK(II,ICC)
      CALL TIMS('LDA-','N/TK',-NTKX,T)
      CALL TIMS('ABY-','N/TK',NTKX,T)
      CALL WCOLC('LDA-','W/CK',IC+70,T,-1)
      XNTKX=NTKX
      CALL GPLOTX(-XNTKX,T,4)
      CALL GPLOTX(XNTKX,T,5)
      DO 3 IT=1,NTKX
      CALL WCOLC('ABY-','W/TK',I,T,1)
    3 CONTINUE
      CALL EAVT('ABY-','A/CK',T)
      NQTQ(I)=NQTQ(I)+NTK(II,ICC)
 3001 FORMAT(2X,'CHECKER',2X,I2,2X,'ARRIVES',2X,'VEH ASSY AREA',2X,'TIME
     Q',2X,F10.4,2X,'CONVOY',2X,I2,2X,'CHECKER TO OPNS OFF',2X,F10.4,2X,
     Q'TRUCKS',2X,I2,2X,'ASSY AREA CONVOY',2X,I3,2X,'LABORERS',2X,I3)
      IF(NQTQ(I).LT.NT(I))GOTO 10
C CONVOY COMPLETE AND C.Q. MOVES TO OPERATIONS WITH CHECKER
      TS=T+(DSQ/RNORM(ICQ,1))*60.
      CALL PLAC(1,TS,12,IC,0)
      WRITE(6,3001)IC,T,I,TS,NTK(II,ICC),NQTQ(I),NLB(II,ICC)
      CALL PLAC(1,TS,13,I,0)
      WRITE(6,3002)I,TS
 3002 FORMAT(2X,'CONVOY',2X,I2,2X,'C. Q.',2X,'ARRIVES OPNS OFFICE'2X,F10
     Q.4)
      RETURN
   10 CONTINUE
C RETURNED CHECKER MOVES TO OPERATIONS OFFICE
      TS=T+(DSQ/RNORM(ICK,1))*60.
      CALL PLAC(1,TS,12,IC,0)
      WRITE(6,3001)IC,T,I,TS,NTK(II,ICC),NQTQ(I),NLB(II,ICC)
      RETURN
      END
      SUBROUTINE CKSRQ(IC,T)
C
C
C CHECKER AND LABORERS RETURNED TO OPERATIONS OFFICE LABOR POOL
      COMMON/CKASG/NCA,NCT(100),NCI(100),NCC(100),NTC(100),NCTT(100,5),N
     QLTT(100)
      COMMON/CHECKER/NGQ,NG,NGC(20),NGCT(20),NGT(20),NGL(20),NGS(20)
      COMMON/LABOR/NHQ,NHL,IRLOAD
```

```
      COMMON/QFCK/NCKT(20),NLB(20,10),NTK(20,10),ITK(20,10,5),NSP(20,10),
     QNFSX(20,10,10),NPT(20,10,10),AGT(20,10,10),NBX(20,10,10),NLX(20,10
     Q,10)
      LEVEL 2, NCK
C RELEASE CHECKERS AND LABORERS TO LABOR POOL
      II=NGCT(IC)
      ICC=NGT(IC)
      NLBX=NLB(II,ICC)
      CALL GPLOTX(1.,T,8)
      XNLBX=NLBX
      CALL GPLOTX(XNLBX,T,9)
      CALL TIMS('LDA-','N/CK',-1,T)
      CALL TIMS('LDA-','N/LB',-NLBX,T)
      NHL=NHL+NLB(II,ICC)
      NG=NG-1
      NDL=NHO-NHL
      WRITE(6,3001)IC,NLB(II,ICC),T,NG,NDL
 3001 FORMAT(2X,'CHECKER',2X,I2,2X,'ARRIVES AT OPNS OFFICE',2X,'LABORERS
     Q',2X,I2,2X,'TIME',2X,F10.4,2X,'CHECKERS ON ASSIGNMENT',2X,I2,2X,
     Q'LABORERS ON ASSIGNMENT',2X,I2)
      NGC(IC)=0
      NGCT(IC)=0
      NGT(IC)=0
      NGL(IC)=0
      NGS(IC)=0
C CHECKER CHECKS ASSIGNMENT QUEUE FOR RELEASE
      IC=1
      NCO=NCA
    5 IF(IC.GT.NCA)RETURN
      I=NCT(IC)
      J=NCTT(IC,1)
      CALL CASSP(I,J,T)
      IF(NCO.GT.NCA)RETURN
      IC=IC+1
      GOTO 5
      END
      SUBROUTINE COSRO(I,T)
C
C
      COMMON/OUTPUT/NGO,NGO,NOC(100)
      COMMON/ATIME/ITIV,ITIA,ITA,ITIE,ITIL,ITBO,ITRO
C START OUTPROCESSING ON CONVOY
      CALL TIMS('OFO-','N/CC',1,T)
      CALL WCOLC('OFO-','W/CC',I+35,T,1)
      CALL GPLOTX(1.,T,7)
      WRITE(6,3001)I,T
 3001 FORMAT(2X,'CONVOY',2X,I2,2X,'C. O. AT OPNS OFFICE OUTPROCESSING',2
     QX,'TIME',2X,F10.4)
      IF(NGO.GT.0.OR.NGO.GT.0)GOTO 20
C OUTPROCESSING CLERK IS NOT BUSY
      CALL QSTAT(4HOUTC,0,5,0,T)
      CALL QSTAT(4HOUTC,0,1,0,T)
      CALL QSTAT(4HOUTC,0,2,0,T)
      CALL HISTO(0.,7)
      NGO=I
      TS=RNORM(ITRO,1)
      CALL COLC('OFO-','S/CC',TS,T)
      TS=T+TS
      CALL PLAC(1,TS,14,I,0)
      WRITE(6,3002)I,TS
 3002 FORMAT(2X,'CONVOY',2X,I2,2X,'OUTPROCESSING STARTED,',2X,'COMPLETED
     Q',2X,F10.4)
      RETURN
   20 CONTINUE
```

```
C OUTPROCESSING CLERK BUSY WITH QUEUE
      CALL QSTAT(4HOUTC,0,1,NQQ,T)
      XNQQ=NQQ
      CALL HISTO(XNQQ,7)
      CALL TIMS('QFQ-','N/QC',1,T)
      CALL QCOL('QFQ-','Q/QC',I,T,1)
      NQQ=NQQ+1
      NQC(NQQ)=I
      WRITE(6,3003)I,NQQ
 3003 FORMAT(2X,'CONVOY',2X,I2,2X,'C. Q. JOINS OUTPROCESSING QUEUE',2X,'
     QPLACE',2X,I2)
      RETURN
      END
      SUBROUTINE CQCMP(I,T)
C
C
C CONVOY C.Q.COMPLETES SRQ OUT-PROCESSING
      COMMON/DEMAND/NS,AT(50),AUNIT(50),NT(50),ATK(50,15),NL(50,15),
     QADOD(50,15,20)
      COMMON/LOAD/ATYP(50,15,20),XQTY(50,15,20)
      COMMON/OUTPUT/NGQ,NQQ,NQC(100)
      COMMON/ATIME/ITIV,ITIA,ITA,ITIE,ITIL,ITBQ,ITRQ
      LEVEL 2, NS
      LEVEL 2, ATYP
      CALL GPLOTX(-1.,T,7)
      CALL RELCV(I,T)
      NTT=NT(I)
      CALL QSTAT(4HOUTC,0,3,0,T)
      CALL TIMS('ABY-','N/TK',-NTT,T)
      CALL TIMS('QFQ-','N/CC',-1,T)
      CALL COLC('ASP-','W/CN',T-AT(I),T)
      CALL EAVT('ASP-','D/CN',T)
      CALL TIMS('ASP-','N/CN',-1,T)
      CALL TIMS('ASP-','N/TK',-NTT,T)
      XNTT=-NTT
      CALL GPLOTX(XNTT,T,1)
      CALL GPLOTX(XNTT,T,5)
      CALL WCOLC('QFQ-','W/CC',I+35,T,-1)
      CALL WCOLC('ABY-','W/TK',I,T,-1)
C DECREASE CONVOYS AT ASP BY ONE RELEASED
      NS=NS-1
      CALL GPLOTX(-1.,T,2)
C CHECK FOR OUT-PROCESSING CLERK QUEUE
      WRITE(6,3001)I,T,NS
 3001 FORMAT(2X,'CONVOY',2X,I2,2X,'RELEASED',2X,'TIME',2X,F10.4,2X,'CONV
     QOYS REMAINING IN ASP',2X,I3)
      IF(NQQ.NE.0)GOTO 10
C QUEUE NOT EXIST AND SET CLERK FLAG TO NOT BUSY
      CALL QSTAT(4HOUTC,0,4,0,T)
      NGQ=0
      WRITE(6,3002)
 3002 FORMAT(2X,'OUTPROCESSING CLERK FREE')
      RETURN
   10 CONTINUE
C QUEUE EXISTS, ASSIGN SERVICE TO NEXT CONVOY C.Q.
      CALL QSTAT(4HOUTC,0,2,0,T)
      CALL TIMS('QFQ-','N/QC',-1,T)
      NGQ=NQC(1)
      IQ=NGQ
      CALL QCOL('QFQ-','Q/QC',IQ,T,-1)
      TS=RNORM(ITRQ,1)
      CALL COLC('QFQ-','S/CC',TS,T)
      TS=T+TS
```

```
      CALL PLAC(1,TS,14,IQ,0)
      WRITE(6,3003)IQ,TS
 3003 FORMAT(2X,'CONVOY',2X,I2,2X,'OUTPROCESSING COMPLETED',2X,F10.4)
C MOVE CLERK QUEUE UP ONE POSITION
      NQQ=NQQ-1
      IF(NQQ.EQ.0)GOTO 21
      DO 20 II=1,NQQ
      NQC(II)=NQC(II+1)
   20 CONTINUE
   21 CONTINUE
      NQC(NQQ+1)=0
      RETURN
      END
      SUBROUTINE RELCV(I,T)
C
C
      COMMON/UNITS/NUNIT,ATITLE(20),DGO(20),DRTN(20),IRSP,ILSP
      COMMON/DEMAND/NS,AT(50),AUNIT(50),NT(50),ATK(50,15),NL(50,15),
     QADOD(50,15,20)
      COMMON/LOAD/ATYP(50,15,20),XQTY(50,15,20)
      LEVEL 2, NS
      LEVEL 2, ATYP
      DO 10 II=1,NUNIT
      IF(ATITLE(II).EQ.AUNIT(I))GOTO 20
   10 CONTINUE
      WRITE(6,3001)I,T
 3001 FORMAT(2X,'ERROR',2X,'RETURNING CONVOY TO UNIT',2X,F10.4)
      RETURN
   20 CONTINUE
      TS=T+(DRTN(II)/RNORM(IRSP,1))*60.
      CALL PLAC(1,TS,15,I,0)
      WRITE(6,3002)I,T,ATITLE(II),DRTN(II),TS
 3002 FORMAT(2X,'CONVOY',2X,I2,2X,'DEPARTING ASP',2X,F10.4,2X,'ARRIVES',
     Q2X,A10,2X,'DISTANCE',2X,F10.4,2X,'TIME',2X,F10.4)
      RETURN
      END
      SUBROUTINE MISC(I,T)
C
C
      COMMON/DEMAND/NS,AT(50),AUNIT(50),NT(50),ATK(50,15),NL(50,15),
     QADOD(50,15,20)
      LEVEL 2, NS
      WRITE(6,3001)I,AUNIT(I),T
 3001 FORMAT(2X,'CONVOY',2X,I2,2X,'ARRIVES',2X,A10,2X,'TIME',2X,F10.4)
      RETURN
      END
      SUBROUTINE TIMS(AQ,AS,NX,T)
      COMMON/TAVE/NUT,NUM(20),AUM(20,2)
      INTEGER AQ,AS,AUM
      DO 10 IX=1,NUT
      IF(AQ.EQ.AUM(IX,1).AND.AS.EQ.AUM(IX,2))GOTO 20
   10 CONTINUE
      WRITE(6,3000)AQ,AS,NX,T
 3000 FORMAT(2X,'TIMS CALL ERROR',2X,2A4,2X,I3,2X,F10.4)
      RETURN
   20 CONTINUE
      NUM(IX)=NUM(IX)+NX
      XX=NUM(IX)
      CALL TIMST(XX,T,IX)
      RETURN
      END
      SUBROUTINE WCOLC(AQ,AS,I,T,IFLAG)
      COMMON/WCOL/LAQ(100),LAS(100),NME(100),TIE(100,50)
```

```
      INTEGER AQ,AS
      DATA AQ/-999/
      IF(LAQ(I).EQ.AQ.AND.LAS(I).EQ.AS)GOTO 19
      IF(IFLAG.LE.0)RETURN
C START NEW FILE
    6 CONTINUE
      LAQ(I)=AQ
      LAS(I)=AS
      NME(I)=1
      TIE(I,1)=T
      RETURN
C ADD TO EXISTING FILE
   15 CONTINUE
      IF(IFLAG.LE.0)GOTO 20
      IRN=NME(I)+1
      TIE(I,IRN)=T
      NME(I)=IRN
      RETURN
C DUMP FILE TO COLCT
   20 CONTINUE
      IRN=NME(I)
      IF(IRN.EQ.0)RETURN
      DO 25 IR=1,IRN
      CALL COLC(AQ,AS,T-TIE(I,IR),T)
   25 CONTINUE
      LAQ(I)=0
      LAS(I)=0
      NME(I)=0
      RETURN
      END
      SUBROUTINE COLC(AQ,AS,XX,T)
      COMMON/EAVE/NUT,ANN(25),ISM(25),AUM(25,2)
      INTEGER AQ,AS,AUM
      DO 10 IX=1,NUT
      IF(AQ.EQ.AUM(IX,1).AND.AS.EQ.AUM(IX,2))GOTO 20
   10 CONTINUE
      WRITE(6,3000)AQ,AS,XX,T
 3000 FORMAT(2X,'COLC CALL ERROR',2X,2A4,2X,2(F10.4,2X))
      RETURN
   20 CONTINUE
      CALL COLCT(XX,IX)
      RETURN
      END
      SUBROUTINE REORD(LI,T)
C
C
C REORDER STOCK AT REORDER POINT
      COMMON/STOCKS/NSL,ADODC(200),XLIO(200),XLIR(200),NLIF(200)
     Q,XLBRD(200),XRDBX(200),XBXPL(200)
C AVERAGE TIME BETWEEN REORDER AND ARRIVAL OF SHIPMENT
      COMMON/REORD/ITRO
C REORDER STOCK LEVEL
      DATA XQO/90./
      NLIF(LI)=1
      TS=T+RNORM(ITRO,1)
      JQO=XQO
      CALL PLAC(1,TS,16,LI,JQO)
      WRITE(6,3001)LI,ADODC(LI),XLIO(LI),T,TS,XQO
 3001 FORMAT(2X,'STOCK LINE',2X,I2,2X,'ITEM',2X,A10,2X,'AT',2X,F10.4,2X,
     Q'REORDERED',2X,'TIME',2X,F10.4,2X,'FILLED',2X,F10.4,2X,'WITH',2X,F
     Q10.4)
      RETURN
      END
```

```
      SUBROUTINE SUPPL(LI,JQ)
C
C
      COMMON/STOCKS/NSL,ADODC(200),XLIQ(200),XLIR(200),NLIF(200)
     Q,XLORD(200),XRORX(200),XQXPL(200)
      COMMON/SITES/DST(60,60),IASP,NFSU,NSTACK(60),ADODX(60,20),
     QALOTX(60,20),XSQTY(60,20)
      LEVEL 2, DST
C ASSUMPTION: RESUPPLY HAS NO EFFECT ON DISTRIBUTION PROCESS
      XJQ=JQ
      XLIQ(LI)=XLIQ(LI)+XJQ
      NLIF(LI)=0
      AQ=ADODC(LI)
      DO 10 I=1,NFSU
      NS=NSTACK(I)
      DO 10 J=1,NS
      IF(AQ.EQ.ADODX(I,J))GOTO 20
   10 CONTINUE
      WRITE(6,3001)LI,XJQ
 3001 FORMAT(2X,'ERROR',2X,'REFILL',2X,'STOCK LINE',2X,I2,2X,'QTY',2X,F1
     QQ.4)
      RETURN
   20 CONTINUE
      XSQTY(I,J)=XSQTY(I,J)+XJQ
      WRITE(6,3002)LI,ADODC(LI),XJQ,XLIQ(LI),I,J,XSQTY(I,J)
 3002 FORMAT(2X,'REFILL COMPLETED',2X,'STOCK LINE',2X,I2,2X,'ITEM',2X,A1
     QQ,2X,'QTY',2X,F10.4,2X,'STOCKAGE',2X,F10.4,2X,'AT FSU',2X,I2,2X,'S
     QTACK',2X,I2,2X,'STOCKAGE',2X,F10.4)
      RETURN
      END
      SUBROUTINE QSTAT(AQ,IQQ,IV,NQ,T)
      COMMON/STAT/NQS,AQS(200),NS(200),NSQ(200),TSS(200),TES(200),
     QIQS(200),TSD(200),TED(200),TSW(200),TEW(200)
      LEVEL 2, NQS
      DO 10 IQ=1,NQS
      IF(AQ.EQ.AQS(IQ).AND.IQQ.EQ.IQS(IQ))GOTO 20
   10 CONTINUE
      RETURN
   20 CONTINUE
      GOTO(101,102,103,104,105),IV
C CUSTOMER ENTERS WAITING QUEUE
  101 CONTINUE
      NS(IQ)=NS(IQ)+1
      NSQ(IQ)=NSQ(IQ)+NQ
      TSW(IQ)=TSW(IQ)+T
      RETURN
C CUSTOMER ENTERS SERVICE FACILITY
  102 CONTINUE
      TEW(IQ)=TEW(IQ)+T
      TSS(IQ)=TSS(IQ)+T
      RETURN
C CUSTOMER LEAVES SERVICE FACILITY
  103 CONTINUE
      TES(IQ)=TES(IQ)+T
      RETURN
C SERVICE FACILITY START IDLE PERIOD
  104 CONTINUE
      TSD(IQ)=TSD(IQ)+T
      RETURN
C SERVICE FACILITY ENDS IDLE PERIOD
  105 CONTINUE
      TED(IQ)=TED(IQ)+T
      RETURN
      END
```

```
      SUBROUTINE OTPUT
      COMMON/SCOM1/ATRIB(25),JEVNT,NFA,NFE(100),NLE(100),MSTOP,NCRDR,N
     QNAPQ,NNAPT,NNATR,NNFIL,NNQ(100),NNTRC,NPRNT,PPARM(200,4),TNOW,
     QTTBEG,TTCLR,TTFIN,TTRIB(25),TTSET
      COMMON/STAT/NGS,AQS(200),NNS(200),NSQ(200),TSS(200),TES(200),
     QIQS(200),TSD(200),TED(200),TSW(200),TEW(200)
      LEVEL 2, ATRIB
      LEVEL 2, NGS
      TM=TNOW-TTBEG
      WRITE(6,1000)
 1000 FORMAT(2X,'QUEUE SUMMARY TABLE'/2X,'FACILITY',2X,'AVE QUEUE',
     Q2X,'AVE WAIT  ',2X,'AVE SERVICE',1X,'FRACTION IDLE')
      DO 10 I=1,NGS
      XNQ=NNS(I)
      IF(XNQ.LE.0.)XNQ=1.
      XQL=NSQ(I)
      AQL=XQL/XNQ
C AVERAGE WAIT TIME
      TW=TEW(I)-TSW(I)
      ATW=TW/XNQ
C AVERAGE SERVICE TIME
      TS=TES(I)-TSS(I)
      ATS=TS/XNQ
C FRACTIONAL IDLE TIME
      TED(I)=TED(I)+TNOW
      TD=TED(I)-TSD(I)
      FTD=TD/TM
C WRITE OUT RESULTS
      IF(IQS(I).EQ.0)GOTO 5
      WRITE(6,1001)AQS(I),IQS(I),AQL,ATW,ATS,FTD
 1001 FORMAT(2X,A4,I2,4X,4(F10.4,2X))
      GO TO 10
    5 CONTINUE
      WRITE(6,1002)AQS(I),AQL,ATW,ATS,FTD
 1002 FORMAT(2X,A4,6X,4(F10.4,2X))
   10 CONTINUE
      RETURN
      END
SMYTH--ASP          1     3    15     7    100222200220201
                  200           1 1000     4     110000
     3
     1
     1    1    1                0.     3000.     1 1000
C ASP NO. 206, DTD. 3/3/79
C DISTANCES FROM HOLDING AND ASSEMBLY AREAS TO OPERATIONS OFFICE
        1.           1.
     1    2
          15.          1.          18.          12.
           4.          0.           5.           3.
C SAFETY INSPECTORS, LABORERS, AND CHECKERS ASSIGNED TO INPROCESSING
     5   23   22
C AVERAGE SERVICE TIMES FOR VARIOUS STAGES OF INPROCESSING
     5    6    7    8    9   10   11
           5.           1.           7.           1.
           2.           0.          10.           0.
             .2         0.          10.           0.
             .71        0.          10.           0.
           6.           0.          10.           0.
           1.           0.          10.           0.
           7.           5.          10.           0.
```

C STOCKAGE INFORMATION

129				
A068	10.	30.	720.	69120.
A071	10.	80.	1680.	80640.
A127	10.	.	.	.
A131	10.	80.	800.	38400.
A165	10.	.	.	.
A400	10.	.	2400.	.
A475	10.	.	1200.	.
A540	10.	.	.	.
A576	10.	80.	200.	9600.
A577	10.	80.	200.	9600.
A585	10.	100.	224.	8064.
A589	10.	70.	170.	8160.
A653	10.	100.	100.	3000.
A792	10.	100.	100.	3000.
B546	10.	55.	72.	2592.
B572	10.	.	.	.
B632	10.	.	.	.
C223	10.	.	.	.
C225	10.	.	.	.
C226	10.	60.	3.	54.
C230	10.	.	.	.
C236	10.	50.	3.	108.
C256	10.	50.	3.	108.
C276	10.	60.	3.	63.
C282	10.	40.	2.	56.
C410	10.	60.	6.	180.
C429	10.	.	.	.
C505	10.	130.	2.	30.
C508	10.	130.	2.	30.
C512	10.	130.	2.	30.
C518	10.	130.	2.	30.
C519	10.	140.	2.	30.
C704	10.	80.	2.	40.
C705	10.	80.	2.	40.
C706	10.	80.	2.	40.
C708	10.	80.	2.	40.
D361	10.	120.	1.	16.
D381	10.	100.	1.	9.
D390	10.	100.	1.	9.
D503	10.	.	.	.
D505	10.	104.	1.	8.
D506	10.	104.	1.	8.
D524	10.	34.	1.	36.
D536	10.	90.	3.	48.
D540	10.	33.	2.	96.
D541	10.	32.	1.	50.
D544	10.	100.	1.	8.
D545	10.	.	.	.
D547	10.	.	.	.
D548	10.	.	.	.
D549	10.	.	.	.
D550	10.	104.	1.	8.
D551	10.	.	.	.
D552	10.	.	.	.
D562	10.	104.	1.	8.
D563	10.	104.	1.	8.
D570	10.	95.	1.	20.
D572	10.	166.6	1.	6.
D579	10.	104.	1.	8.
D651	10.	200.	1.	6.
D675	10.	30.	1.	50.

D676	10.	58.	1.	32.
D680	10.	216.6	1.	6.
D681	10.	.	.	.
D684	10.	216.6	1.	6.
G890	10.	50.	25.	800.
H050	10.	80.	8.	128.
H110	10.	140.	16.	48.
H488	10.	140.	3.	36.
H534	10.	.	.	.
H554	10.	.	.	.
H555	10.	120.	15.	45.
H826	10.	130.	4.	64.
K090	10.	.	.	.
K092	10.	45.	4.	192.
K121	10.	.	.	.
K180	10.	50.	1.	45.
K250	10.	72.	2.	48.
L306	10.	.	.	.
L307	10.	.	.	.
L308	10.	.	.	.
L311	10.	.	.	.
L312	10.	.	.	.
L323	10.	.	.	.
L324	10.	.	.	.
L495	10.	50.	16.	384.
M023	10.	50.	30.	1080.
M032	10.	.	.	.
M035	10.	.	.	.
M036	10.	.	.	.
M037	10.	.	.	.
M038	10.	.	.	.
M039	10.	50.	1.	20.
M078	10.	.	30.	.
M130	10.	.	.	.
M131	10.	.	.	.
M420	10.	.	.	.
M421	10.	75.	1.	18.
M456	10.	80.	3000.	27000.
M626	10.	80.	150.	3000.
M627	10.	.	.	.
M629	10.	.	.	.
M630	10.	.	.	.
M670	10.	.	.	.
M756	10.	.	.	.
M766	10.	.	.	.
N200	10.	.	.	.
N248	10.	30.	8.	576.
N276	10.	.	.	.
N278	10.	30.	8.	576.
N280	10.	.	.	.
N285	10.	.	8.	576.
N308	10.	.	8.	576.
N311	10.	30.	8.	576.
N319	10.	.	.	.
N323	10.	.	.	.
N335	10.	30.	8.	576.
N402	10.	25.	8.	960.
N411	10.	65.	12.	324.
N412	10.	.	.	.
N417	10.	.	.	.
N463	10.	.	12.	324.
N523	10.	60.	500.	12000.

```
  N525            10.          .          .          .
  Z997            10.         90.         1.        12.
  Z998            10.         70.         1.        20.
  Z999            10.        130.         1.         9.
  REDEYE          10.        110.         1.         6.
  CHAPARRAL       10.        350.         1.         4.
C FIELD STORAGE UNIT INFORMATION
   55
   10
  D506                        760.
  D534        HC 19-19       2736.
  D540        LS  9-21       1152.
  D540        LS  9-22       3936.
  D541        ICP27-46       1300.
  D541        IOP35-35        950.
  D541        IOP47- 8       1450.
  D541        LOP18- 3        700.
  D541        LOP19- 1       1200.
  D541        LOP19- 8       1250.
    8
  D506                        760.
  D534        HC 22- 3       2700.
  D540        LS  9-24       4512.
  D541        LOP19- 9        850.
  D541        LOP19-11       1100.
  D541        LOP19-14        600.
  D541        LOP19-15       1750.
  D541        LOP19-16       1500.
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  D541        MI 10-10       4900.
  D541        MI 10-11       4400.
    1
  D544                       3600.
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  D544                       3600.
   12
  A068                      22600.
  A071                      92400.
  A131                     422400.
  A475                      28800.
  A653                      11000.
  A792                      11400.
  B546                       9000.
  C505        IOP97- 2       1790.
  C508        SV  9- 9       1630.
  C518        SV 27- 4        482.
  C519                        224.
  D570                         80.
    5
  C236                        648.
  C256        RVA77- 2       3132.
  C704                       1640.
  C705                        880.
  G890                      11200.
    8
  A576                     105600.
  A589                      28900.
  C512                        180.
  C706                        160.
  C708                        170.
  D505                        336.
  D550                        224.
  L495                        384.
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```

D544		3600.
1		
D544		3600.
1		
D544		3600.
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D544		3440.
1		
D562		3360.
1		
D562		4000.
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D563		4528.
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D579		640.
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D579		480.
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8		
N248		864.
N278		864.
N288		2520.
N308		8640.
N338		8640.
N402		576.
N463		5184.
N523		50000.
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N248		864.
N278		864.
N288		2520.
N338		8640.
N463		5184.
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K092		9600.
1		
K092		9600.
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K180		1935.
1		
K180		1935.
1		
D651		1680.
1		
D651		1680.
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D651		1620.
1		
K180		1935.
1		
K180		1935.
3		
H488		900.
H555		810.
H826		1664.
3		
H488		900.
H555		855.
H826		1728.
2		
Z997	RSA 4- 7	804.
Z997	RSA 9- 1	504.
3		
Z997	RSA 9- 1	336.

[redacted]	RSA10- 2	732.
[redacted]	RSA10- 4	240.
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[redacted]	RSA10- 4	636.
2000	RSA 9- 1	300.
[redacted]	RSA 9- 3	240.
2000	RSA 9- 2	320.
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2000	RSA 6- 3	320.
2000	RSA 6- 4	80.
REDEYE	RSA106-1	12.
REDEYE	RSA106-3	84.
REDEYE	RSA106-4	54.
REDEYE	RSA107-2	6.
REDEYE	RSA107-3	78.
REDEYE	RSA107-4	24.
CHAPARRAL	RSA71- 1	43.
CHAPARRAL	RSA71- 2	48.
CHAPARRAL	RSA71- 3	20.
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REDEYE	RSA107-4	84.
REDEYE	RSA107-5	66.
REDEYE	RSA108-1	42.
REDEYE	RSA108-2	114.
REDEYE	RSA108-4	108.
CHAPARRAL	RSA71- 3	28.
CHAPARRAL	RSA71- 4	56.
CHAPARRAL	RSA71- 5	52.
CHAPARRAL	RSA71- 7	40.
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K180		1935.
2		
K180		1115.
K250		1248.
2		
K250		1464.
M023		12960.
4		
M039		240.
M421		244.
M456		36000.
M626		5400.
3		
D675	LS 9-24	1650.
D676	MS 8- 5	1088.
D676	MS 9- 3	1122.
3		
D675	LS 9-27	1650.
D676	MS10- 7	1184.
D676	MS10-11	1824.
2		
D680		1080.
D684		872.
2		
D680		1080.
D684		872.
6		
A576		113200.
A589		28900.
C226		432.
C276	EA197	630.
C512		210.
D505		328.
4		

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C256          RVAC1- 4          3348.
C704                            1800.
C705                             920.
G090                           12000.
  5
A071                           92400.
A131                          480000.
A792                           11400.
C505          IOP99- 7          2890.
C508          SV  4-17           770.
  0
  0
  0
  0
  0
  0
  0
  0
C REORDER STATISTICS
  12
      7200.          0.        8000.          0.
C ASSIGNMENT OF MHE'S TO FIELD STORAGE UNITS
  2
 20    3
  2
 20    3
  2
  1   21
  2
  1   21
  2
  1   21
  1
  2
  2
  2   11
  2
  2    5
  3
  3    4   22
  3
  3    4   22
  3
  3    4   22
  3
  3    4   22
  3
  3    4   22
  3
  5    6   23
  3
  5    6   23
  3
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  3
  5    6   23
  3
  5    6   23
  1
  7
  1
  7
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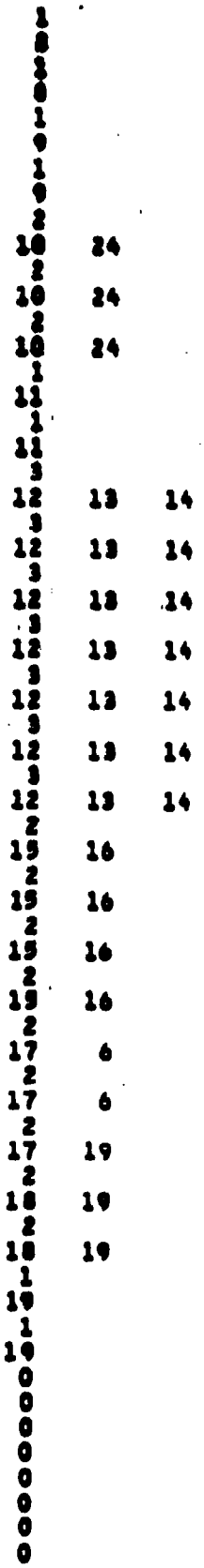

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8		
1		
9		
1		
9		
2		
10	24	
2		
10	24	
2		
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1		
11		
1		
11		
3		
12	13	14
3		
12	13	14
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12	13	14
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12	13	14
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12	13	14
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3		
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17	6	
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17	6	
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17	19	
2		
18	19	
2		
18	19	
1		
19		
1		
19		
0		
0		
0		
0		
0		
0		
0		
0		

```
C ROAD-DISTANCE CARDS AND ROADSPEED STATISTIC INDEX
  69
   0    6    1.7    6   21    2.2   21   34    2.0   34   56    6.5
   0   21    3.8   21   23    0.8   21   56    5.9    0   23    4.7
  23   38    1.1   38   56    6.3    0    8    1.8    8   38    4.0
   8   39    4.0    8   40    4.0   39   56    6.3   40   56    6.8
   0    1    1.9    1    4    1.0    4   45    5.8   45   56    2.
   0    4    1.5    4   56    8.0    4    8    0.3    8   13    0.8
  13   56    6.9    1   13    2.0   13   15    1.1   13   16    1.1
  15   19    0.8   16   19    0.8   19   56    6.0    1   56    8.8
   6   19    2.0    8   19    2.0   19   35    2.4   35   56    6.6
   0   30    5.8   30   56    6.6    0   32    5.8   32   56    6.5
   6   32    4.1    0   35    6.2    6   35    4.3    8   35    4.3
   0   25    4.8   25   56    4.8   25   43    2.2    0   41    6.5
  41   43    0.2   43   56    3.0   35   41    3.7   41   56    3.3
   6   30    4.2    6   32    4.2    6   34    4.2    8   30    4.2
   8   32    4.2    8   34    4.2    0    7    1.9    6    7    0.2
   7    8    0.1    7   19    2.0   35   45    4.6    6   56    7.9
   8   56    7.7    6    8     .2    8   21    2.2   38   39     .5
  39   40     .5
   3
        15.          1.          18.          12.
C MATERIAL HANDLING EQUIPMENT INFORMATION
  24
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   1    1    1    1    1    1    1    1    1    2
   2    2    2    2
   3    2   17
C505          C508          C512          C518          C519          D505
D506          D544          D550          D562          D563          D579
D534          D536          D540          D541
  18
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        4.          .0          10.          .0
        2.          .0          10.          .0
        2.          .0          10.          .0
        2.          .0          10.          .0
        2.          .0          10.          .0
        2.          .0          10.          .0
        2.          .0          10.          .0
        2.          .0          10.          .0
        2.          .0          10.          .0
        2.          .0          10.          .0
        2.          .0          10.          .0
        2.          .0          10.          .0
        2.          .0          10.          .0
        2.          .0          10.          .0
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        2.          .0          10.          .0
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4.134	1.846	7.654	2.246
4.134	1.846	7.654	2.246
1.094	.328	1.991	.631
1.094	.373	1.991	.631
1.094	.328	1.991	.631
1.094	.373	1.991	.631
1.094	.371	1.991	.631
1.094	.373	1.991	.631
1.094	.373	1.991	.631
1.094	.406	2.704	1.546
1.094	.406	2.704	1.546
1.094	.406	2.704	1.546
1.094	.406	2.704	1.546
4.	.0	10.	.0
4.17	1.976	9.966	1.884
4.17	1.976	9.966	1.884
4.17	1.976	9.966	1.884
4.17	1.976	9.966	1.884
4.17	1.976	9.966	1.884
.605	.26	1.782	.35
.605	.26	1.782	.35
.605	.26	1.782	.35
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.605	.26	1.782	.35
.605	.26	1.782	.35
.605	.26	1.782	.35
4.17	1.976	9.966	1.884
4.17	1.976	9.966	1.884
4.17	1.976	9.966	1.884
4.17	1.976	9.966	1.884
2.	.0	10.	.0
4.392	1.33	5.992	2.533
4.392	1.33	5.992	2.533
4.392	1.33	5.992	2.533
4.392	1.33	5.992	2.533
4.392	1.33	5.992	2.533
1.056	.310	1.621	.742
1.056	.310	1.621	.742
1.056	.310	1.621	.742
1.056	.310	1.621	.742
1.056	.310	1.621	.742
1.056	.310	1.621	.742
1.056	.310	1.621	.742
1.647	.425	2.722	1.1
1.647	.425	2.722	1.1
1.647	.425	2.722	1.1
1.647	.425	2.722	1.1
4.	.0	10.	.0
3.77	1.505	6.822	2.088
3.77	1.505	6.822	2.088
3.77	1.505	6.822	2.088
3.77	1.505	6.822	2.088
3.77	1.505	6.822	2.088
1.198	.271	1.694	.867
1.198	.271	1.694	.867
1.198	.271	1.694	.867
1.198	.271	1.694	.867

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          1.198          .271          1.694          .867
          1.198          .271          1.694          .867
          3.584          .97           5.766         2.304
          3.584          .97           5.766         2.304
          3.584          .97           5.766         2.304
          3.584          .97           5.766         2.304
          2.             .0           10.            .0
C LABORER LOADING INFORMATION
   17
         20.             .0           30.            .0
CC UNITS IN SCENERIO
   14    4   16
         30.          7.           36.          24.
         15.          5.           30.            .0
  1/21 INF        47.          47.
  121  122
         12.             .0           50.            .0
         25.             .0           50.            .0
   2
   1   1   5
   1
   6   0   0          11   2
   8   0   0          29   2
  30   2               0   0
  32   7               6   2
  34   2              14   2
   1   1   6
   2
   6   0   0           2   2
   7   7              40   2
   8   0   0           4   2
  19   0   0          10   2
  35   1               4   2
  45   0   0          11   2
1/21 INF          2
  8TG            9
  A068         BOX              1.
  A071         BOX              1.
  A131         BOX              9.
  A576         BOX             29.
  H555         PALLET           2.
  Z997         PALLET           7.
  Z997         BOX              6.
  Z998         PALLET           2.
  Z998         BOX             14.
  8TG           19
  B546         BOX              2.
  C256         PALLET           3.
  C704         PALLET           2.
  C705         PALLET           1.
  G890         PALLET           1.
  C236         BOX             11.
  C704         BOX              7.
  C705         BOX              6.
  G890         BOX             16.
  C706         BOX              2.
  C708         BOX              2.
  N308         BOX              1.
  N335         BOX              1.
  N402         BOX              4.
  N463         BOX              4.
  REDEYE       PALLET           1.
  REDEYE       BOX              4.
```

```
C226          BOX                 8.
C276          BOX                 3.
1/25 INF          67.          46.
125  124
        12.          .0          50.          .0
        25.          .0          50.          .0
 2
 1   1   5
 1
 6   0   0          11   2
 8   0   0          29   2
30   2               0   0
32   7               6   2
34   2              14   2
 1   1   6
 2
 6   0   0           2   2
 7   7              40   2
 8   0   0           4   2
19   0   0          10   2
35   1               4   2
45   0   0          11   2
1/25 INF          2
 8TG            9
 A068          BOX                 1.
 A071          BOX                 1.
 A131          BOX                 9.
 A576          BOX                29.
 H555          PALLET              2.
 Z997          PALLET              7.
 Z997          BOX                 6.
 Z998          PALLET              2.
 Z998          BOX                14.
 8TG            19
 B546          BOX                 2.
 C256          PALLET              3.
 C704          PALLET              2.
 C705          PALLET              1.
 G890          PALLET              1.
 C236          BOX                11.
 C704          BOX                 7.
 C705          BOX                 6.
 G890          BOX                16.
 C706          BOX                 2.
 C708          BOX                 2.
 N308          BOX                 1.
 N335          BOX                 1.
 N402          BOX                 4.
 N463          BOX                 4.
 REDEYE        PALLET              1.
 REDEYE        BOX                 4.
 C226          BOX                 8.
 C276          BOX                 3.
 2/21 INF          50.          50.
 125  126
        12.          .0          50.          .0
        25.          .0          50.          .0
 2
 1   1   5
 1
 6   0   0          11   2
 8   0   0          29   2
```

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  30   2                 0   0
  32   7                 6   2
  34   2                14   2
   1   1   6
   2
   6   0   0             2   2
   7   7                40   2
   8   0   0             4   2
  19   0   0            10   2
  35   1                 4   2
  45   0   0            11   2
2/21 INF          2
  8TG            9
  A068          BOX                1.
  A071          BOX                1.
  A131          BOX                9.
  A576          BOX               29.
  H555          PALLET             2.
  Z997          PALLET             7.
  Z997          BOX                6.
  Z998          PALLET             2.
  Z998          BOX               14.
  8TG           19
  B546          BOX                2.
  C256          PALLET             3.
  C704          PALLET             2.
  C705          PALLET             1.
  G890          PALLET             1.
  C236          BOX               11.
  C704          BOX                7.
  C705          BOX                6.
  G890          BOX               16.
  C706          BOX                2.
  C708          BOX                2.
  N308          BOX                1.
  N335          BOX                1.
  N402          BOX                4.
  N463          BOX                4.
  REDEYE        PALLET             1.
  REDEYE        BOX                4.
  C226          BOX                8.
  C276          BOX                3.
  1/68 ARMD       55.          43.
  127  128
          9.            .0         50.            .0
         24.            .0         50.            .0
   2
   2   2   2
   1   2
   6  12  C505          34   4
   8   0   0            10   4
   3   1   5
   3
   6   0   0            34   4
   8   0   0            31   4
   7   3  C704          13   4
  19   0   0             5   4
  35   1  REDEYE         4   4
1/68 ARMD         3
  8TG            1
  C505          PALLET             8.
  8TG            7
  C505          BOX                9.
  C508          PALLET             4.
```

```
C508          BOX              5.
C512          BOX             10.
C518          BOX             13.
C519          BOX              6.
B546          BOX              1.
8TG            15
C704          PALLET           2.
C704          BOX              7.
C705          PALLET           1.
C705          BOX              6.
C706          BOX              2.
C708          BOX              2.
N335          BOX              1.
N463          BOX              4.
REDEYE        PALLET           1.
REDEYE        BOX              4.
A071          BOX              1.
A131          BOX             32.
A475          BOX              1.
A576          BOX              9.
A589          BOX             18.
1/70 ARMD       39.          30.
129  130
        9.          .0        50.          0.
       24.          .0        50.          0.
 2
 2   2   2
 1   2
 6  12  C505        34   4
 8   0  0           10   4
 3   1   5
 3
 6   0  0           34   4
 8   0  0           31   4
 7   3  C704        13   4
19   0  0            5   4
35   1  REDEYE       4   4
1/70 ARMD        3
8TG            1
C505          PALLET           8.
8TG            7
C505          BOX              9.
C508          PALLET           4.
C508          BOX              5.
C512          BOX             10.
C518          BOX             13.
C519          BOX              6.
B546          BOX              1.
8TG            15
C704          PALLET           2.
C704          BOX              7.
C705          PALLET           1.
C705          BOX              6.
C706          BOX              2.
C708          BOX              2.
N335          BOX              1.
N463          BOX              4.
REDEYE        PALLET           1.
REDEYE        BOX              4.
A071          BOX              1.
A131          BOX             32.
A475          BOX              1.
A576          BOX              9.
A589          BOX             18.
```

```
2/68 ARMD        39.          31.
131  202
        9.          .0          50.          0.
       24.          .0          50.          0.
 2
 2   2   2
 1   2
 6  12  C505        34   4
 8   0   0          10   4
 3   1   5
 3
 6   0   0          34   4
 8   0   0          31   4
 7   3   C704       13   4
19   0   0           5   4
35   1   REDEYE      4   4
2/68 ARMD        3
 8TG           1
 C505        PALLET          8.
 8TG           7
 C505        BOX             9.
 C508        PALLET          4.
 C508        BOX             5.
 C512        BOX            10.
 C518        BOX            13.
 C519        BOX             6.
 B546        BOX             1.
 8TG          15
 C704        PALLET          2.
 C704        BOX             7.
 C705        PALLET          1.
 C705        BOX             6.
 C706        BOX             2.
 C708        BOX             2.
 N335        BOX             1.
 N463        BOX             4.
 REDEYE      PALLET          1.
 REDEYE      BOX             4.
 A071        BOX             1.
 A131        BOX            32.
 A475        BOX             1.
 A576        BOX             9.
 A589        BOX            18.
 1/57 FA        63.          55.
 133  134
        14.          .0          50.          .0
        40.          .0          50.          .0
 6
 0   2   3
 1   2
 1   7  D506         0   0
 4  30  D544         0   0
45   3  D505         0   0
 0   3   1
 3   4   5
 4  60  D544         0   0
 0   2   3
 6   7
 4   9  D544         0   0
 8   1  D550         0   0
13  30  D562         0   0
 0   2   5
 8   9
 1   5  D534         1   3
```

```
  13   4  D562          0   0
  15  21  D563          0   0
  16   5  D579          0   0
  19   1  N335          8   2
   1   2   1
  10  11
   1  19  D540         33   3
   1   1   4
  12
   6   0  0             5   2
   8   0  0             8   2
  19   0  0            24   2
  35   1  REDEYE        0   0
1/57 FA          12
  8TG             3
  D505          PALLET          3.
  D506          PALLET          7.
  D544          PALLET         10.
  8TG             1
  D544          PALLET         20.
  8TG             1
  D544          PALLET         20.
  8TG             1
  D544          PALLET         20.
  8TG             1
  D544          PALLET         20.
  8TG             3
  D544          PALLET          9.
  D550          PALLET          1.
  D562          PALLET         10.
  8TG             1
  D562          PALLET         20.
  8TG             2
  D562          PALLET          4.
  D563          PALLET         16.
  8TG             6
  D563          PALLET          5.
  D579          PALLET          5.
  D534          PALLET          5.
  D534          BOX            21.
  N335          PALLET          1.
  N278          BOX             8.
  8TG             3
  D540          PALLET          3.
  D540          BOX            33.
  D541          PALLET          6.
  8TG             1
  D541          PALLET         10.
  8TG             7
  A071          BOX             1.
  A131          BOX             3.
  A576          BOX             8.
  B546          BOX             1.
  N463          BOX            24.
  N523          BOX             3.
  REDEYE        PALLET          1.
  1/76 FA         52.         52.
  135  136
        14.          .0         50.          .0
        40.          .0         50.          .0
   6
   0   2   3
   1   2
   1   7  D506         0   0
```

```
  6  30  D544          0   0
 45   3  D505          0   0
  0   3   1
  3   4   5
  4  60  D544          0   0
  0   2   3
  6   7
  4   9  D544          0   0
  8   1  D550          0   0
 13  30  D562          0   0
  0   2   5
  8   9
  1   5  D534          1   3
 13   4  D562          0   0
 15  21  D563          0   0
 16   5  D579          0   0
 19   1  N335          8   2
  1   2   1
 10  11
  1  19  D540         33   3
  1   1   4
 12
  6   0  0             5   2
  8   0  0             8   2
 19   0  0            24   2
 35   1  RCDEYE        0   0
1/76 FA          12
  8TG             3
  D505          PALLET          3.
  D506          PALLET          7.
  D544          PALLET         10.
  8TG             1
  D544          PALLET         20.
  8TG             1
  D544          PALLET         20.
  8TG             1
  D544          PALLET         20.
  8TG             1
  D544          PALLET         20.
  8TG             3
  D544          PALLET          9.
  D550          PALLET          1.
  D562          PALLET         10.
  8TG             1
  D562          PALLET         20.
  8TG             2
  D562          PALLET          4.
  D563          PALLET         16.
  8TG             6
  D563          PALLET          5.
  D579          PALLET          5.
  D534          PALLET          5.
  D534          BOX            21.
  N335          PALLET          1.
  N278          BOX             8.
  8TG             3
  D540          PALLET          3.
  D540          BOX            33.
  D541          PALLET          6.
  8TG             1
  D541          PALLET         10.
  8TG             7
  A071          BOX             1.
  A131          BOX             3.
```

```
A576          BOX                 8.
B546          BOX                 1.
M463          BOX                24.
M523          BOX                 3.
REDEYE        PALLET              1.
2/77 FA          56.            56.
137  138
        16.          .0          50.          .0
        31.          .0          50.          .0
 6
 0   2   3
 1   2
 1   7  D506          0   0
 4  30  D544          0   0
45   3  D505          0   0
 0   3   1
 3   4   5
 4  60  D544          0   0
 0   2   3
 6   7
 4   9  D544          0   0
 8   1  D550          0   0
13  30  D562          0   0
 0   2   5
 8   9
 1   5  D534          1   3
13   4  D562          0   0
15  21  D563          0   0
16   5  D579          0   0
19   1  N335          8   2
 1   2   1
10  11
 1  19  D540         33   3
 1   1   4
12
 6   0  0             5   2
 8   0  0             8   2
19   0  0            24   2
35   1  REDEYE        0   0
2/77 FA          12
 8TG             3
 D505          PALLET            3.
 D506          PALLET            7.
 D544          PALLET           10.
 8TG             1
 D544          PALLET           20.
 8TG             1
 D544          PALLET           20.
 8TG             1
 D544          PALLET           20.
 8TG             1
 D544          PALLET           20.
 8TG             3
 D544          PALLET            9.
 D550          PALLET            1.
 D562          PALLET           10.
 8TG             1
 D562          PALLET           20.
 8TG             2
 D562          PALLET            4.
 D563          PALLET           16.
 8TG             6
 D563          PALLET            5.
 D579          PALLET            5.
```

```
D534          PALLET          9.
D534          BOX            21.
N335          PALLET          1.
N278          BOX             8.
8TG             3
D540          PALLET          3.
D540          BOX            33.
D541          PALLET          6.
8TG             1
D541          PALLET         10.
8TG             7
A071          BOX             1.
A131          BOX             3.
A576          BOX             8.
B546          BOX             1.
N463          BOX            24.
N523          BOX             3.
REDEYE        PALLET          1.
1/58 FA          43.         43.
139  140
        16.          .0        50.          .0
        31.          .0        50.          .0
 4
 0   2   1
 1   2
25  28                0   0
 0   2   2
 3   4
25  18                0   0
43  10                0   0
 1   2   2
 5   6
41   0   0           35   3
43  26                0   0
 2   2   5
 7   8
 6   0   0            7   4
 8   0   0            4   4
19   0   0           61   4
35   1                0   0
41  12                0   0
1/58 FA           8
 8TG             1
 D651          PALLET          14.
 8TG             1
 D651          PALLET          14.
 8TG             1
 D651          PALLET          14.
 8TG             2
 D651          PALLET           4.
 D680          PALLET          10.
 8TG             2
 D680          PALLET          10.
 D684          PALLET           4.
 8TG             2
 D684          PALLET          12.
 D675          BOX             35.
 8TG             2
 D675          PALLET           3.
 D676          PALLET           7.
 8TG            11
 D676          PALLET           2.
 N248          BOX             12.
 N285          BOX             35.
```

```
[illegible]          BOX                 10.
[illegible]          BOX                  4.
[illegible]          BOX                  1.
REDEYE          PALLET                1.
A071            BOX                   1.
A131            BOX                   5.
A576            BOX                   4.
B546            BOX                   1.
1/59 FA            60.            42.
141  142
          16.            .0          50.          .0
          31.            .0          50.          .0
 4
 0   2   1
 1   2
25  28                  0   0
 0   2   2
 3   4
25  18                  0   0
43  10                  0   0
 1   2   2
 5   6
41   0   0             35   3
43  26                  0   0
 2   2   5
 7   8
 6   0   0              7   4
 8   0   0              4   4
19   0   0             61   4
35   1                  0   0
41  12                  0   0
1/59 FA          8
 8TG            1
 D651          PALLET          14.
 8TG            1
 D651          PALLET          14.
 8TG            1
 D651          PALLET          14.
 8TG            2
 D651          PALLET           4.
 D680          PALLET          10.
 8TG            2
 D680          PALLET          10.
 D684          PALLET           4.
 8TG            2
 D684          PALLET          12.
 D675          BOX             35.
 8TG            2
 D675          PALLET           3.
 D676          PALLET           7.
 8TG           11
 D676          PALLET           2.
 N248          BOX             12.
 N285          BOX             35.
 N335          BOX             10.
 N463          BOX              4.
 N523          BOX              1.
 REDEYE        PALLET           1.
 A071          BOX              1.
 A131          BOX              5.
 A576          BOX              4.
 B546          BOX              1.
1/92 ADA          25.          25.
143  144
```

```
          5.          .0        50.          .0
         16.          .0        50.          .0
  2
  0   3   1
  1   2   3
 35  24                0   0
  1   2   3
  4   5
  6   2               39   3
  8   0   0           11   3
 35   2                0   0
1/92 ADA          5
 ST              1
 CHAPARRAL    PALLET          8.
 ST              1
 CHAPARRAL    PALLET          8.
 ST              1
 CHAPARRAL    PALLET          8.
 ST              4
 A792         PALLET          2.
 A792         BOX             7.
 B546         BOX             2.
 REDEYE       PALLET          2.
 ST              5
 A068         BOX             1.
 A071         BOX             2.
 A131         BOX             7.
 A576         BOX            11.
 A653         BOX            20.
 121 CBT AV      17.         17.
 145  146
          6.          .0        50.          .0
         19.          .0        50.          .0
  4
  0   2   1
  1   2
 30  11               10   2
  0   1   1
  3
 30   4               12   2
  0   2   1
  4   5
 32  20                0   0
  1   1   2
  6
  6   0   0           30   2
 32   2                9   2
121 CBT AV        6
 ST              1
 H488         PALLET          6.
 ST              3
 H488         PALLET          1.
 H488         BOX            10.
 H826         PALLET          4.
 ST              2
 H826         PALLET          4.
 H826         BOX            12.
 ST              1
 Z997         PALLET         10.
 ST              1
 Z997         PALLET         10.
 ST              6
 A071         BOX             1.
 A131         BOX            21.
```

```
A053          BOX                 7.
B546          BOX                 1.
Z997          PALLET              2.
Z997          BOX                 9.
223 ENG          27.           16.
147  148
        19.            .0          50.          .0
        34.            .0          50.          .0
 4
 0   1   4
 1
 6   0   0            13   2
 8   0   0             7   2
21   1                 0   0
34   1                 4   2
 0   5   2
 2   3   4   5   6
21   7                 4   2
23   7                 0   0
 0   5   2
 7   8   9  10  11
23  13                 0   0
38   2                 0   0
 0   2   4
12  13
 5   0   0             2   2
38   2                17   2
39   1                 0   0
40   2                 6   2
223 ENG          13
2.5T             8
A071          BOX                 1.
A131          BOX                 5.
A576          BOX                 7.
B546          BOX                 1.
D570          BOX                 6.
K092          PALLET              1.
Z998          PALLET              1.
Z998          BOX                 4.
2.5T             1
K092          PALLET              3.
2.5T             1
K092          PALLET              3.
2.5T             3
K092          PALLET              1.
K092          BOX                 4.
K180          PALLET              1.
2.5T             1
K180          PALLET              3.
2.5T             1
K180          PALLET              3.
2.5T             1
K180          PALLET              3.
2.5T             1
K180          PALLET              3.
2.5T             1
K180          PALLET              3.
2.5T             1
K180          PALLET              3.
2.5T             2
K180          PALLET              1.
K250          PALLET              2.
2.5T             4
K250          PALLET              2.
```

```
[illegible]        BOX          17.
[illegible]        BOX           2.
M023        PALLET        1.
3.57          .5
M039        PALLET        1.
M421        PALLET        1.
M421        BOX           2.
M456        BOX           1.
M626        BOX           3.
C CUSTOMER SCENARIO
  34
      0.     1/21 INF
      0.     1/25 INF
      0.     2/21 INF
      0.     1/68 ARMD
      0.     1/70 ARMD
      0.     2/68 ARMD
      0.     1/57 FA
      0.     1/76 FA
      0.     2/77 FA
      0.     1/58 FA
      0.     1/59 FA
      0.     1/92 ADA
      0.     121 CBT AV
      0.     223 ENG
    360.     223 ENG
    480.     1/57 FA
    480.     1/76 FA
    480.     2/77 FA
    480.     1/58 FA
    480.     1/59 FA
    720.     223 ENG
    720.     1/21 INF
    720.     1/25 INF
    720.     2/21 INF
    720.     1/68 ARMD
    720.     1/70 ARMD
    720.     2/68 ARMD
    720.     121 CBT AV
    960.     1/57 FA
    960.     1/76 FA
    960.     2/77 FA
    960.     1/58 FA
    960.     1/59 FA
   1080.     223 ENG
```